UNITED STATES DEPARTMENT OF AGRICULTURE

AGRICULTURAL RESEARCH SERVICE

ANIMAL HUSBANDRY RESEARCH DIVISION

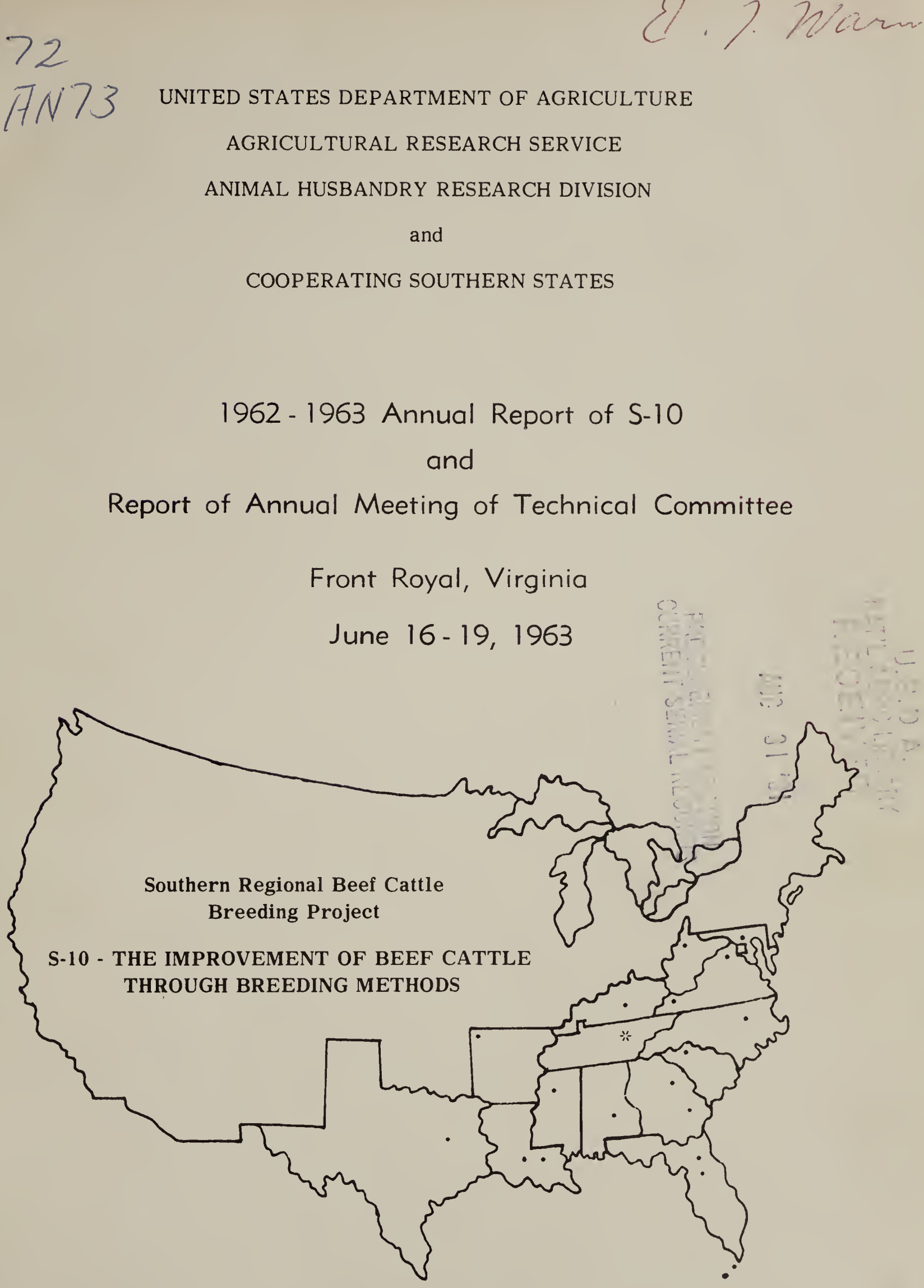
and

COOPERATING SOUTHERN STATES

1962 - 1963 Annual Report of S-10
and
Report of Annual Meeting of Technical Committee

Front Royal, Virginia

June 16 - 19, 1963



This report is intended for the use of administrative leaders and workers and is not for general publication.

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PERSONNEL OF THE S-10 PROJECT

I. Technical Committee:

Alabama	T. B. Patterson
Arkansas	C. J. Brown
Florida	Marvin Koger
Georgia	W. C. McCormick
Kentucky	N. W. Bradley
Louisiana	N. C. England
Maryland	W. W. Green
Mississippi	C. E. Lindley
North Carolina	E. U. Dillard
South Carolina	W. C. Godley
Tennessee	C. S. Hobbs
Texas	T. C. Cartwright
Virginia	T. J. Marlowe
West Virginia	H. E. Kidder

II. U. S. Department of Agriculture:

E. J. Warwick, Chief, Beef Cattle Research Branch, AH, ARS, Beltsville, Maryland
R. S. Temple, Investigations Leader, S-10
W. C. Burns, Superintendent, West Central Florida Experiment Station, Brooksville, Florida
J. W. High, Superintendent, Iberia Livestock Experiment Station, Jeanerette, Louisiana
B. M. Priode, Superintendent, Beef Cattle Research Station, Front Royal, Virginia
M. J. Burris, Animal Geneticist, CSESS, Washington, D. C.

III. Regional Officers - 1963

R. E. Patterson, Administrative Advisor, College Station, Texas
W. C. McCormick, Chairman, Tifton, Georgia
T. B. Patterson, Secretary, Auburn, Alabama
E. U. Dillard, Executive Committee Member, Raleigh, North Carolina

INTRODUCTION

This project was initiated in 1948 to investigate and develop methods of breeding more productive beef cattle for the South. Detailed annual reports showing research developments and progress in each state have been prepared each year since 1950.

This publication includes the proceedings of the 1963 annual meeting of the S-10 Technical Committee and the annual reports of projects in each of the 13 cooperating states. The annual reports of S-10 contributing and supporting projects were prepared by the project leaders and other personnel at the various stations as summaries of the research developments and progress at each station during 1962. The results are not considered final, but the material will aid cooperators and the Regional Coordinator in developing an integrated program. This report also provides information needed by heads of animal husbandry departments, experiment station directors, and U. S. Department of Agriculture officials for evaluation of the projects with respect to objectives and procedures. This report is not for general distribution and material contained in it should not be quoted in publications.

SCOPE OF THE PROJECT AND RECENT DEVELOPMENTS

The Southern Regional Beef Cattle Breeding Project, S-10, had active, contributing projects from 13 states and the Animal Husbandry Research Division of the Agricultural Research Service, U. S. Department of Agriculture, in 1963. Experiments which contributed to the S-10 project were conducted at three USDA experiment stations, located at Jeanerette, Louisiana; Brooksville, Florida; and Front Royal, Virginia, and at 33 state experiment stations in the various states. The three USDA stations are operated cooperatively with the state in which they are located. An inventory taken on July 1, 1963, indicated that there was a total of 20,744 head of beef cattle in research herds at the experiment stations contributing to this project. Some of the cattle at these experiment stations are used simultaneously in other projects, as well as in the S-10 project, so that when the percentage of use in the S-10 project is figured, approximately 16,000 head of cattle contribute directly to the S-10 project. The total number of cattle on the experiment stations in the Southern Region included 9589 cows two years and over, 2258 yearling heifers, 3596 bulls and steers under one year of age, 3315 heifers under one year of age, 711 bulls over one year of age, and 1275 steers over one year of age. The total number of cattle inventoried this year is considerably larger than last year, since projects have been revised and cattle have been obtained and allotted to these projects.

Revision of the dwarfism project at Florida has been completed and work at that station will continue in cooperation with the Medical School on mucopolysaccharidosis of the dwarf.

Continued effort is being spent on the study of crossbreeding at several of the experiment stations, including studies on subsequent crosses after the single cross. Studies of inbreeding are being carried

on at two stations. Selection for single traits and traits in combination are being studied at several stations. Continued emphasis is being placed on the development of more precise methods of beef cattle improvement with respect to performance characteristics, such as growth rate, efficiency, milking ability and cow productivity, adaptation to environmental conditions, and quality of meat.

RESEARCH RESULTS DURING THE YEAR

Research results in the S-10 project are cumulative and are of a continuing nature, since the beef cattle breeding projects cover a period of several years.

A four-year summary of reproduction data taken on breeding herds of contributing projects from 1957 through 1960 indicated that approximately 77 percent of all cows bred during the breeding season gave birth to calves (dead and alive). Approximately 72 percent of these cows raised calves until weaning. Considerable variation exists among states for the weaning percentage, varying from as low as 64 percent to as high as 88 percent over the four-year period. On the average, cows that were nursing a calf when bred weaned approximately 4 percent more calves during the subsequent season that did cows which were dry when bred. Four year old cows, when bred, weaned 4.5 percent more calves than the average. Yearlings were approximately 1 percent below the average, two-year-olds were 2 percent below, and three-year-olds were approximately 1 percent below. In this four year study, pasture mating of cows resulted in approximately 36 percent more calves than did artificial insemination. There was little difference in percent of conception between hand mating and pasture mating. It is interesting to note that approximately 8 percent of the cows in this study were removed each year for reproductive causes. In this same study, a comparison of six breeds - Angus, Brahman, Brangus, Hereford, Santa Gertrudis, and Shorthorn - indicated that Herefords weaned the greatest number of calves, followed by Angus, Santa Gertrudis, Brangus, Shorthorn, and Brahman, respectively. The three British breeds studied had a higher conception rate when they were nursing a calf when bred, while the three zebu breeds had the highest conception rate when they were dry during the breeding season.

In this same four-year study, calf losses, on the average, amounted to about 7.5 percent up to weaning time. This figure includes calves born dead, calves dead within 36 hours, and calves which died between 36 hours after birth and weaning time. Cows that were four years old or older when bred had approximately 4.8 percent less calf death losses up to 36 hours than yearlings, and approximately 3 percent less than those bred as two year olds. Cows that were nursing a calf when bred had about 4.5 percent less calf death losses the following year than did cows which were dry when bred.

During the past year, 5584 cows were exposed. Of this number, 81.5 percent gave birth to calves, while only 73.4 percent weaned live calves. Of the calves born, approximately 90 percent were weaned, indicating that calf death losses (dead at birth and dead up to weaning) amounted to about 10 percent for this past year. The average weaning percentage was greatest for Herefords, followed closely by Angus, Brangus,

Shorthorn, Santa Gertrudis, and Brahman. However, of all calves born, Brangus weaned the greatest percentage, followed by Hereford, Shorthorn, Angus, Brahman, and Santa Gertrudis. Average birth weight by breed for the past year was: 69.3 pounds for 1731 Herefords, 60.2 pounds for 1031 Angus, 67.2 pounds for 190 Shorthorns, 74.2 pounds for 96 Santa Gertrudis, 61.8 pounds for 169 Brahmans, and 68.0 pounds for 70 Brangus. Average daily gain up to weaning was 1.68 pounds for 1546 Herefords, 1.76 pounds for 897 Angus, 1.68 for 130 Shorthorns, 1.95 for 65 Santa Gertrudis, 1.71 for 107 Brahman, and 1.68 for 48 Brangus.

In a study of cows that did not conceive during the regular breeding season, it was noted that during a subsequent 27-day breeding period cows nursing calves had a lower pregnancy percent (43%) than cows not nursing calves (62%). It was also noted in this study that supplemental feeding further increases the conception rate of these cows. When the relationship between the growth rate of heifers up to two years of age and their subsequent calving percentage at three years of age was studied, it was found that, in general, lightweight calves at weaning had lower subsequent fertility rates than heavier calves.

The age at which heifers first come into heat has been studied for different breeds and crosses. These data indicate that of four straightbreds studied - Angus, Hereford, Brangus, and Brahman - the Angus, on the average, came in heat earlier, followed by Hereford, Brangus, and Brahman, respectively. Among back-cross heifers, three-quarter Shorthorn heifers reached puberty earlier than three-quarter Angus, three-quarter Hereford, three-quarter Brangus, three-quarter Charolais, and three-quarter Brahman. No heterosis has been noted for age of puberty for the breeds and crosses studied.

Variation of milk production between and within breeds continues to be studied. There is additional evidence that a significant relationship exists between milk production of the dam and calf gains. One study has shown no noticeable decline in milk production through the lactation period in beef cows, as has been reported in dairy cows. Also, this work shows that milk yields within breed vary from slightly less than two pounds to more than 18 pounds of milk during mid-lactation. These data are from some 400 cows of Angus, Brahman, Hereford, Shorthorn, Santa Gertrudis, half-Brahman, half-Hereford, and half-Charolais breeding.

Studies on growth rate continue to give evidence of the heritability of that trait. Data from progeny of high and low gaining sires ranked in the same way for growth rate as did their sires. These data show that from one-sixth to one-third of the differences between the high and low gaining sires are demonstrated in the progeny. These estimates of the heritability of growth rate agree quite closely with past estimations from other stations.

It appears that the dam exerts the major influence on calf birth weight. Evidence indicates that larger differences in birth weight of the calf were associated with genotype of the dam rather than with the genotype of the sire. Evidence indicates that as Brahman breeding increased in the dam, calf birth weights decreased. The fact that

Brahman bulls sired calves larger than the average of all breeds while Brahman cows produced the smallest calves at birth indicates that the small size of purebred Brahman calves at birth may not be due to a genetic condition in the calf, but rather to some limitation in its prenatal environment. These data indicate that one would expect little difficulty at parturition from breeding small cows to large breeds of bulls, since the size of the calf at birth is primarily dependent upon the dam.

There is an indication in one study that bulls which eat more, gain faster, and have a heavier weight per day of age, as well as greater wholesale cut weights and yields and a higher proportion of fore-quarter cuts. Correlations between feed conversion and wholesale cut weights were low or negative, as were correlations between performance records and taste-panel scores.

Data from several stations have shown that environmental effects have different influences on different breeds and at different locations. This indicates that it is important not to use the same correction factors regardless of breed, location, age, and so forth.

Analysis of data from crossbreeding experiments continues to indicate that crossbred offspring show some heterosis over the average of the parent breeds. An analysis of 180-day calf weights indicated that there was a substantial advantage of the crossbreds over the average of the purebreds (15.9%) and that back-cross calves by crossbred dams were 18.8 percent heavier than the average of the purebreds. Apparently there is an interaction between breed or cross and age of dam. Hereford, Brahman, and first-cross dams of these two breeds exhibit markedly different response curves due to age.

Heterosis was also exhibited in the feedlot gains when calves were put on full feed. This heterotic effect has been shown to be as much as 11 percent in some cases.

There appears to be little advantage in reproduction efficiency when two straightbred parents are mated. However, a limited amount of data indicated that there was as much as a 9.5 percent advantage in reproduction efficiency of first-cross dams, as compared to the average of the parents. Calves of crossbred dams showed a 15 percent advantage as far as survival to weaning time was concerned, when compared to the average of the parents.

Considerable information is being collected at several stations in the Region on subsequent crosses after the single cross. Data involving single crosses, back-crosses, three-breed crosses, and straightbreds indicate that the three-breed cross excells the other mating systems.

Data from an inbreeding study which included a study of calf mortality indicated that the incidence of stillbirths (5% to 13%) is about the same among inbreds and non-inbreds. However, losses among inbred calves born alive are 1 to 10 percent higher than for non-inbreds.

Studies of carcass and meat characteristics in relation to genetic aspects of improvement are being conducted by several of the stations. The heritability of certain carcass traits has been estimated, and genetic correlations among carcass traits and live production traits have been made. Except when the carcass traits are connected in some way with size, most genetic correlations between carcass traits and live production traits are low.

An effort has been made during the past year to collect considerable data on the use of ultrasonics as a tool in live animal carcass evaluation. Results to date have been limited, but indications are that this may be a promising tool for the measurement of fat thickness in the live animal. Evidence in the past has shown that fat thickness and carcass weight make a fairly good predictive measurement of total muscle in the carcass. If a good estimate of fat thickness in the live animal could be obtained, faster progress could be made in selection for muscling. Correlations of estimated fat thickness by ultrasonic techniques with actual fat thickness taken on the carcass have ranged from a low of 0.2 to a high of 0.9. However, these studies have been on a limited number of animals. Correlations between estimated rib-eye area and actual rib-eye area, as traced on the carcass, are, in general, from 0.4 to 0.7. One station has indicated that repeatability of measurement between operators seems to be quite high, while evidence from another station indicates this repeatability to be of a much lower magnitude.

In a comparison of seven breeds and three types - beef type, dairy type, and zebu type - it is interesting to note that loin steaks from dairy-type steers were most tender when evaluated by a Warner-Bratzler shear machine. Most of the advantage in the dairy type was contributed by the Jersey breed, which seemed to be quite tender, both as evaluated by shearing and on a tenderness score evaluated by a panel. It should be noted, however, that tenderness difference between the Jerseys and the Herefords was not significant except when evaluated by a family panel. In addition, Jersey steers were least efficient on production, next to lowest on daily gains, and produced the poorest carcass yields. Holstein steers on the same test had the highest daily gains, with the highest feed efficiency, and produced carcasses with high cutting yields. They were average among breeds in eating quality. Tha Brahman had a higher percent of separable muscle, but had poor feedlot performance and ranked at the bottom on palatability scores. Santa Gertrudis and Brahman crosses had acceptable gains, feed conversion, and carcass cutability, but were usually ranked next to Brahmans on palatability score. Angus carcasses graded highest of all, but had low cutting yields, largely due to a higher percent of fat. Hereford carcasses had higher cutting yields and were graded slightly higher than Angus on palatability, despite a significantly lower carcass grade and degree of marbling. Both British breeds were above average in palatability.

There is evidence that a larger rib-eye area is associated with faster gains and larger size, but is not associated with improved feed conversion, type, increased yield of higher-priced wholesale cuts, or improved eating quality.

Two experiments devoted to the study of genetic-environmental interactions are being continued in the Region. Both of these studies are relatively new, and few results have been forthcoming.

FUTURE PLANS

The S-10 Technical Committee has undertaken a revision of the S-10 project. It is hoped that this revision can be completed during the coming year. Even though a revision is being made, most of the beef cattle breeding work in the Southeastern United States is of a long-time nature, and general changes are not contemplated. Work will be continued along the lines of selection, breeding systems, beef quality and carcass work, studies of genetic abnormalities, and projects of related interest.

PUBLIC INTEREST IN THE PROGRAM

Data from the S-10 Regional Beef Cattle Breeding Project have been used in various phases of beef cattle production in the South. Information arising from this project has been utilized in over 42 field days and in 11 popular articles during the past year. An estimated 100 talks have been given relating information from this project to the public. Data from this project have been utilized in setting up beef cattle improvement associations in various states. A recent survey indicates that there are over 1850 herds on production testing programs in the Southern United States, involving over 166,000 head of breeding cows. Information on approximately 56,000 head of calves was related to their owners for use in herd improvement. Progeny test information has been taken on over 17,000 sires and these data have been given to the respective breeders. On-the-farm bull performance testing programs have been initiated in at least eight states, and it is estimated that over 6000 sires have been evaluated on these tests. There were 2035 sires evaluated during the past year in 13 central bull tests in the Southern United States. Eight states reported sales in connection with their central bull tests, while 11 states have sales in which performance-tested bulls, although not tested in central bull tests, have been sold. Average prices of performance tested bulls range from $385.00 to $3,791.00.

Certain states have indicated interest by breeders in expansion of beef cattle improvement associations into the areas of carcass information, bull fertility information, and so on.

PROGRAM
S-10 TECHNICAL COMMITTEE MEETING
June 16-19, 1963

June 16

Assemble, Beef Cattle Research Station, Front Royal, Virginia

7:00 p.m. Executive Committee meeting

June 17

8:30 a.m. Welcome, B. M. Priode, Superintendent, Beef Cattle Research Station
Introductions and announcements

9:00 a.m. Report on Virginia crossbreeding experiment - R. C. Carter

10:00 a.m. Use of Beef Cattle Improvement Association Records in Research - T. J. Marlowe

10:30 a.m. Use of BCIA Program in a Private Herd - C. E. Johnson, BCIA cooperator, Sperryville, Virginia

11:00 a.m. Sheep Breeding Work at the Virginia Station - R. C. Carter

11:45 a.m. Lunch

12:45 p.m. Discussion of the Front Royal breeding work - K. P. Bovard and B. M. Priode

1:45 p.m. Tour of the Beef Cattle Research Station facilities

5:30 p.m. Dinner. The Role of the Front Royal Beef Cattle Research Station and the Virginia Agricultural Experiment Station in Regional Research Work - G. W. Litton, Head, Animal Husbandry Department, VPI

June 18

8:30 a.m. Genetic Aspects of Feed Efficiency - G. E. Dickerson, Director of Research, Kimber Farms, Fremont California

9:30 a.m. Biochemical Aspects of Feed Efficiency and Utilization - G. P. Lofgreen, Animal Husbandry Department, University of California, Davis

10:45 a.m. Symposia of regional research work in feed effcicency - C. J. Brown, Arkansas; R. S. Temple, Brooksville, Florida data; T. C. Cartwright, Texas; and J. P. Fontenot, Virginia

12:00 noon Lunch

1:00 p.m. Committee report on proposed revision of S-10 project - T. C. Cartwright

1:30 p.m. Thirty-minute station reports:
Alabama - T. B. Patterson
Arkansas - C. J. Brown
Florida, Gainesville - Marvin Koger
Florida, Brooksville - W. C. Burns
Georgia - W. C. McCormick
Kentucky - N. W. Bradley
Louisiana, Baton Rouge - Noah England
Louisiana, Jeanerette - J. W. High

6:00 p.m. Dinner and Business Meeting

June 19

8:00 a.m. Coordinator's report on reproduction data - R. S. Temple

8:30 a.m. Discussion of proposed revision of the S-10 project

9:45 a.m. Discussion and review of various contributing projects

12:00 noon Adjourn

S-10 TECHNICAL COMMITTEE MEETING
Front Royal, Virginia
June 16-19, 1963

The 1963 meeting of the S-10 Technical Committee was held at the Beef Cattle Research Station, Front Royal, Virginia, June 16-19 (see program for schedule of events).

Dr. W. C. McCormick, Chairman, called the meeting to order. Mr. B. M. Priode, Superintendent of the Beef Cattle Research Station welcomed the group to Front Royal.

Those attending the meetings were:

Name	Institution	State
T. B. Patterson*	Auburn University	Auburn, Alabama
C. J. Brown*	University of Arkansas	Fayetteville, Arkansas
H. J. Williams	University of Arkansas	Fayetteville, Arkansas
Marvin Koger*	University of Florida	Gainesville, Florida
W. C. Burns	West Central Florida Exp. Sta.	Brooksville, Florida
J. R. Crockett	University of Florida	Gainesville, Florida
F. M. Peacock	Range Cattle Exp. Sta.	Ona, Florida
W. C. McCormick*	Ga. Coastal Plain Exp. Sta.	Tifton, Georgia
T. M. Clyburn	Ga. Coastal Plain Exp. Sta.	Tifton, Georgia
J. C. Johnson	Ga. Coastal Plain Exp. Sta.	Tifton, Georgia
R. A. Long	University of Georgia	Athens, Georgia
D. G. Steele	University of Kentucky	Lexington, Kentucky
Noah England*	Louisiana State University	Baton Rouge, Louisiana
J. W. High	Iberia Livestock Exp. Sta.	Jeanerette, Louisiana
T. M. DeRouen	Iberia Livestock Exp. Sta.	Jeanerette, Louisiana
J. C. Taylor	Mississippi State University	State College, Mississippi
E. U. Dillard*	North Carolina State College	Raleigh, North Carolina
J. R. Hill	North Carolina State College	Raleigh, North Carolina
O. W. Robinson	North Carolina State College	Raleigh, North Carolina
H. A. Stewart	North Carolina State College	Raleigh, North Carolina
Rodolfo Vaccaro	North Carolina State College	Raleigh, North Carolina
W. C. Godley*	Clemson College	Clemson, South Carolina
R. F. Wheeler	Clemson College	Clemson, South Carolina
C. S. Hobbs*	University of Tennessee	Knoxville, Tennessee
H. M. Jamison	University of Tennessee	Knoxville, Tennessee
T. C. Cartwright*	Texas A and M University	College Station, Texas
R. J. Cooper	Texas A and M University	College Station, Texas
Walter Kruse	Texas A and M Univ., Exp. Sta. 23	McGregor, Texas
H. O. Kunkel**	Texas A and M University	College Station, Texas
T. J. Marlowe*	Virginia Polytechnic Institute	Blacksburg, Virginia
B. M. Priode	Beef Cattle Research Station	Front Royal, Virginia
K. P. Bovard	Beef Cattle Research Station	Front Royal, Virginia
H. T. Bryant	Northern Va. Pasture Res. Sta.	Middleburg, Virginia
R. C. Carter	Virginia Polytechnic Institute	Blacksburg, Virginia
A. L. Eller	Virginia Polytechnic Institute	Blacksburg, Virginia
J. P. Fontenot	Virginia Polytechnic Institute	Blacksburg, Virginia
J. L. Gill	Virginia Polytechnic Institute	Blacksburg, Virginia

Name	Institution	State
R. C. Hammes	Northern Va. Pasture Res. Sta.	Middleburg, Virginia
G. W. Litton	Virginia Polytechnic Institute	Blacksburg, Virginia
H. Matthiessen	Virginia Polytechnic Institute	Blacksburg, Virginia
Curtis Mast	Virginia Polytechnic Institute	Blacksburg, Virginia
W. H. McClure	Shenandoah Valley Research Sta.	Steeles Tavern, Virginia
D. C. Meyerhoeffer	Virginia Polytechnic Institute	Blacksburg, Virginia
Kitty Smith	Virginia Polytechnic Institute	Blacksburg, Virginia
D. W. Vogt	Virginia Polytechnic Institute	Blacksburg, Virginia
Luis Rivera-Brenes	University of Puerto Rico	Rio Piedras, Puerto Rico
M. J. Burris	USDA, CSESS	Washington, D. C.
E. J. Warwick	USDA, ARS, AH	Beltsville, Maryland
James Bond	USDA, ARS, AH	Beltsville, Maryland
R. E. Davis	USDA, ARS, AH	Beltsville, Maryland
N. R. Ellis	USDA, ARS, AH	Beltsville, Maryland
C. M. Kincaid	USDA, ARS, AH	Beltsville, Maryland
R. P. Lehmann	USDA, Biometrical Services	Beltsville, Maryland
I. L. Lendahl	USDA, ARS, AH	Beltsville, Maryland
P. A. Putnam	USDA, ARS, AH	Beltsville, Maryland
P. J. Reynolds	USDA, ARS, AH	Beltsville, Maryland
J. D. Robbins	USDA, ARS, AH	Beltsville, Maryland
G. M. Sidwell	USDA, ARS, AH	Beltsville, Maryland
C. E. Terrill	USDA, ARS, AH	Beltsville, Maryland
G. E. Dickerson	Kimber Farms	Fremont, California
J. B. D. Huey	Ministry of Agriculture	Northern Ireland
C. E. Johnson		Sperryville, Virginia
G. P. Lofgreen	University of California	Davis, California
R. S. Temple	USDA, ARS, AH - Investigations Leader, S-10	Knoxville, Tennessee

* Technical Committee members

** Representing Dr. R. E. Patterson, Administrative Advisor, S-10

MINUTES OF S-10 EXECUTIVE COMMITTEE MEETING
8:45 p.m. - June 16, 1963
Front Royal, Virginia

Executive Committee Chairman, W. C. McCormick, presided.

Others present - H. O. Kunkel, E. J. Warwick, M. J. Burris, R. S. Temple, E. U. Dillard, T. J. Marlowe, B. M. Priode, and T. B. Patterson

Chairman McCormick announced that the resolutions committee would be as follows:

W. C. Burns
C. S. Hobbs
W. C. Godley, Chairman.

A report on the progress of a popular-type article on the history, objectives, and accomplishments of S-10 to date was given by R. S. Temple. Due to previous commitments, Dr. Bruce L. Warwick has declined an invitation to write this article. A discussion followed about the possibility of R. S. Temple writing the article. The Executive Committee recommended that after disposing of previous commitments and completing work on the reproduction data, R. S. Temple would author the article. Further, it was suggested that publication, preferrably, would be at the University of Tennessee and that financial arrangements would be similar to those for the crossbreeding study published by Texas A and M.

The Executive Committee reviewed and discussed the plans and program for the present meeting. B. M. Priode, T. J. Marlowe, and R. S. Temple supplied the details and discussed the tour.

The short symposium on feed efficiency to be presented by members of the S-10 group was discussed. Those presenting data in this part of the program include: C. J. Brown, Arkansas; T. C. Cartwright, Texas; J. P. Fontenot, Virginia; and R. S. Temple, ARS (Brooksville, Florida data).

It was announced that revision plans for the S-10 project would be presented at the business meeting Tuesday night and again Wednesday morning.

Respectfully submitted,

T. B. Patterson
Secretary

MINUTES OF S-10 TECHNICAL COMMITTEE MEETING
June 18-19, 1963
Front Royal, Virginia

Chairman W. C. McCormick presided at the meetings.

W. C. Godley moved that the minutes of last year's Technical Committee meeting be approved as circulated. The motion was seconded by C. J. Brown, and was passed.

The minutes of the Executive Committee meeting - held in conjunction with the Southern Section, ASAS, meetings in Memphis - were read. E. U. Dillard moved that the minutes be accepted as read. Marvin Koger seconded the motion, and it was passed.

The minutes of the Executive Committee meeting at Front Royal were read and discussed. It was pointed out that the reason Dr. Bruce L. Warwick turned down the invitation to write an account of the history and developments of the S-10 project was because of previous commitments and that this reason should be made a part of the record. The minutes were corrected. Koger moved acceptance of the corrected minutes; Dillard seconded the motion, and it was passed.

A call for reports by committees resulted in the following responses:

Data Analysis - no report
Carcass Evaluation - no report
Project Revision Committee - report later

Appropriate remarks were made by Dr. H. O. Kunkel, representing Dr. R. E. Patterson, Administrative Advisor, S-10

Timely remarks were also made by Dr. E. J. Warwick, Dr. M. J. Burris, and Dr. H. A. Stewart.

A report of the activities of the S-10 "Investigations Leader", R. S. Temple, included the following:

(1) A report on his meeting with the Southern Directors in Atlanta.
(2) A discussion of extensive work with the IBM 1620 during December, January, and February in order to be of further help to individual project leaders within the region.
(3) A reminder to project leaders that revision of projects would not be necessary, even if the S-10 project is revised, if the individual project has been revised recently.
(4) A report on recent work with the Somascope.
(5) A speech made to the recent Reciprocal Meats Conference will be distributed later to each Technical Committee member.

Under new business, J. C. Taylor, of Mississippi, extended an invitation for the group to meet at Mississippi for the 1964 meeting. C. S. Hobbs moved that we accept this invitation, C. J. Brown seconded the motion, and it was passed. Hobbs extended an invitation for the group to meet at Tennessee in 1965. No official action was taken on this invitation.

A discussion on testing of inbred lines was initiated by Hobbs as a result of comments made by Dr. L. E. Hawkins, Director of Oklahoma Agricultural Experiment Station. Temple commented on the possibility of test-crossing inbred lines within the region and between regions. R. C. Carter suggested that perhaps top crossing would be more desirable than between-line crossing. Koger reminded the group that Dr. Dickerson had said that, even in chickens, between-line crosses were not made, but rather out-crosses were made to accomplish a specific purpose. Dr. Warwick suggested that the Executive Committee examine the possibility of studying this problem on a regional basis. No further action was taken by the Technical Committee.

A report of the Resolutions Committee was made by W. C. Godley, as follows:

BE IT RESOLVED

(1) That the S-10 Technical Committee express its appreciation to Mr. B. M. Priode of the USDA, Dr. K. P. Bovard of VPI, and other members of the staff at Front Royal and VPI for their efforts in arranging the facilities, for their fine hospitality, for the well planned and informative tour of the station, and for their many other efforts in our behalf during the meeting.

(2) That the committee express its appreciation to the State Department, and especially to Mr. L. J. Redding of the State Department, Front Royal, Virginia, for the use of their facilities.

BE IT FURTHER RESOLVED that the Committee extend its special thanks to Prof. G. W. Litton for the interesting and informative discussion on the role of Front Royal and the Virginia Agricultural Experiment Station in regional research.

BE IT FURTHER RESOLVED that the committee express its sincere thanks to Dr. G. E. Dickerson, Kimber Farms, Fremont, California; and to Dr. G. P. Lofgreen, University of California, Davis, California, for their stimulating and informative presentations on feed efficiency.

BE IT FURTHER RESOLVED that the members of the Committee extend to the Virginia BCIA appreciation for their hospitality during the meeting.

The Committee recommends that a copy of these Resolutions be sent to Dr. H. N. Young, Director of the Virginia Agricultural Experiment Station; Dr. E. J. Warwick, Chief, Beef Cattle Research Branch, USDA, Beltsville, Maryland; Mr. J. P. Irwin, Department of State, Washington, D. C.; the president of the Virginia BCIA program; and to each individual mentioned in the Resolutions.

Godley moved that the Resolutions be accepted as read; Hobbs seconded the motion, and it was passed.

C. J. Brown, Arkansas, was elected as the new member of the Executive Committee on the first ballot.

T. C. Cartwright moved that the S-10 project statement be revised or rewritten, that the proposed objectives be accepted as guide lines for developing procedures statements, that each Technical Committeeman develop procedures for which his station will be responsible, and that a committee be appointed to harmonize procedures with objectives and edit the final project statement. The motion was seconded by Koger, and it carried. Chairman McCormick appointed the committee to consist of:

T. C. Cartwright, Chairman
R. S. Temple
C. J. Brown
T. B. Patterson (replacing McCormick).

C. S. Hobbs moved that the reproduction data be published as a regional publication following the procedure as outlined at last year's meeting at Auburn. Koger seconded the motion, and it was passed.

Respectfully submitted,

T. B. Patterson
Secretary

GENETICS OF FEED CONVERSION[1]

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In the broad sense, the genetics of feed conversion is the genetics of livestock improvement. Feed costs account for one-half to two-thirds of the production costs for meat, milk, and eggs. Other production costs, for labor, equipment, and interest in investment, are almost directly proportional to the rate of growth or production per livestock unit and, hence, are closely associated with feed costs per unit of production. There is no question concerning the importance of improving feed conversion, but there are many questions concerning how to bring about such genetic improvement most efficiently.

Components of Feed Conversion

Feed conversion sounds much simpler than it really is, being influenced by such variables as rate of growth or production, composition of growth or product, composition of feed consumed, nutritional requirements for body maintenance alone, appetite, maternal influence, and reproductive performance. Some clarification of the relationships of these variables to each other and to feed conversion is helpful in considering how best to improve efficiency of converting feed into animal product.

Rate of growth or production is of first importance because it is the primary determinant of the proportion of total feed consumed that is converted into the animal product, whether it be meat, milk, eggs, or wool.

The composition of the product is important, both in terms of desirability or economic value of the product and of the energy content per unit weight of product. In animal breeding, we are primarily concerned with economic value per unit of product.

Both the energy and the nutrient content of feed influence the gross efficiency of feed conversion, and, hence, should be standardized in assessing genetic differences.

Food required for maintenance of body metabolism and activity is important as an overhead cost to be reduced either (1) by shortening the period of body maintenance time required per unit of gain in weight or of production or (2) by reducing the feed requirements for body maintenance and activity per unit of time.

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[1]Paper presented at the S-10 Technical Committee meeting, June 16-19, 1963, Front Royal, Virginia.

Appetite or rate of feed consumption is most closely and positively associated with efficient feed conversion when dictated by variations in true growth impulse, but less so when associated with variations in the composition of gains in body weight. However, some experiences with pigs and with yellow Agouti mice (Dickerson, 1947a, 1947b) have taught me that when energy requirements for maintenance are large relative to those for gain in weight, a genetically slightly larger appetite can greatly increase efficiency of gain in body weight even though the additional gain is in fat deposition.

Maternal influences on feed conversion are largely nutritional, affecting viability and growth during prenatal and preweaning periods, but influencing post-weaning feed conversion through direct effects upon the body composition at weaning and through pleiotropic associations of these effects with those of maternally transmitted gene influences on the physiology of the offspring.

Reproductive rate also is a highly important determinant of net efficiency of feed conversation, because it so largely determines the initial feed cost per productive unit (e.g., per calf at weaning). Also, there is the possibility of pleiotropic association between reproductive rate and efficiency of feed conversion.

Significance of Feed Conversion in Poultry

Specialized meat producing chickens are often cited, with justification, as an example of remarkably rapid improvement in efficiency of feed conversion. It is interesting to reflect that the genetic contribution to this improvement has come largely from selection for growth rate and conformation, with feed conversion as a by-product. Of course, changes in the energy level, particularly, in the nutrient balance of broiler rations, and in disease control, are partly responsible for the present 40 percent efficiency in converting feed into live chickens (not including the feed required to produce the broiler chick). Changes in composition have been governed by some selection for live conformation but primarily by the younger age of broilers at market weight. This has led to a higher percentage of bone than is desirable; a lower ratio of bone to edible meat should be attainable.

Since the live wieght at market has remained reasonably constant at 3 to 4 pounds, the primary goal has been, and still is, to reduce feed costs and other costs which are proportional to the time required to reach the market weight. Rapid gains increase the proportion of feed consumption used for gains and reduce the other time sensitive costs (i.e., for labor, housing, investment, etc.).

The production cost of the broiler chick is affected greatly by the reproductive performance of the parents, especially the female. There is some evidence, also, of a negative relationship between growth rate and egg production in broiler stock. It appears to arise from the well documented negative genetic correlation of egg size and rate, and the maternal influence of egg size on the age at which broiler chicks reach market weight. Until recently, egg production has been

given little attention in meat strains of chickens because of the severe competitive emphasis on growth rate (and feed conversion) of the broiler chick. Now that broiler producers are more commonly assuming the costs of the parent flocks and of hatching the broiler chicks, more emphasis is being placed on efficient reproduction.

The general approach for obtaining the maximum combination of growth rate and reproduction in meat chickens includes use of heterosis from crossing strains to improve both reproduction and the maternal influence on chick growth, in addition to the selection within and between strains for efficient gains and desirable carcass composition.

In specialized egg producting stocks of chickens, present levels of efficiency in egg production (nearly 40% during the laying period) have been achieved by selection for more eggs per bird, larger egg size, and smaller body size, including selection for heterosis in strain crosses. Studies of egg stocks in Random Sample Tests have found that 80 to 95 percent of the variance in feed conversion is determined by these three factors; the remainder would include effects of variation in physical activity and metabolic rate confounded with error variation.

If we assume that energy requirements for maintenance are directly proportional to body size, the gene for sex-linked dwarfism in chickens provides a means for estimating what proportion of the total feed consumption is used for maintenance in the normal sized layer. Dwarf chickens produce about 16 percent less total weight of eggs but are about 30 percent smaller in body size and require about 10 percent less feed per pound of eggs produced, compared with normal sized sisters. From these results, one can estimate that about two-thirds of the feed consumed by the normal layer is used for maintenance. Obviously, increasing the rate of production relative to body size will reduce the maintenance and the total feed required per pound of eggs produced even though there is no change in the efficiency of converting the feed consumed above maintenance requirements into eggs. For example, if pounds of egg production per bird in a given period of time is increased 10 percent without change in body size, maintenance feed per pound of eggs would be reduced by 9 percent and total pounds of feed consumed would increase only 3.3 percent, so that total feed per pound of eggs would decline by about 6 percent (i.e., $\frac{1.033}{1.10} - 1$). This illustrates why genetic improvements in rate of growth or production are so important for net feed conversion, even though there may be no gain, or even some loss, in efficiency of converting food consumed in excess of maintenance requirements into meat, milk, or eggs.

Economically important variables in composition of eggs, thus far, are size, shape, shell strength and smoothness, albumen thickness, and incidence of blood and meat spots. Among these, some are definitely negatively related to rate of production, and hence interfere with improvement in the efficiency of feed conversion.

There are relatively few problems with maternal influences and with reproductive rate because of generally positive associations of these traits with rate of egg production.

Breeding for Efficient Feed Conversion in Beef Cattle

The first requirement in devising the most effective method of selecting for efficient feed conversion is definition of efficiency. As a general principle, an adequate definition of efficiency must, in effect, include the ratios of market body weight (adjusted for composition) to (a) feed consumed in excess of maintenance requirements, (b) feed required for maintenance, (c) other costs which are proportional to time required to reach market weight, and (d) feed and other costs of the breeding herd per calf weaned which vary with percentage calf crop and viability. The definition of net merit used by Swiger, et al. (1962) included (a) and (b) above under feed consumed from weaning to 1000 pounds liveweight and (c) as other costs varying with days from weaning to 1000 pounds, but (d) was ignored, as was composition of gain, because data were unavailabe.

Good nursing ability (i.e., heavier weaning weight) would contribute to less feed from weaning to 1000 pounds, both because of fewer days of maintenance (b) and fewer pounds of gain needed (a), as well as to reduction in other costs from a shorter feeding period (c).

More rapid daily gain from weaning to 1000 pounds would reduce feed required for maintenance (b) and other costs proportional to time required to reach 1000 pounds liveweight (c), but would increase the total feed consumed above maintance requirements (a) though not necessarily per unit of gain, and would not directly influence breeding herd costs per calf weaned (d).

Reducing total feed consumed from weaning to 1000 pounds would directly improve (a) and (b) and would be associated with improved (c) as well, but would ignore (d) and probably would favor less fat carcasses. Swiger, et al. (1962) estimated that selection for reduced feed consumption from weaning to 1000 pounds would produce as rapid gains in "net merit" as would selection for an index including weaning weight and daily gain as well as estimated feed consumption. The chief disadvantage of feed consumed to a constant final weight is the necessity of estimating this quantity for animals which vary widely in actual "Final" weight on feed.

Daily gain adjusted for differences in feed consumption and average body weight (Gain A, as studied by Koch et al. 1963) is an interesting measure of efficiency in use of the feed consumed above requirements for maintenance (a) but ignores the large and highly important feed (b) and other costs (c) which vary with the time required to produce the desired gain in weight (including effects of variations in appetite), as well as breeding herd costs per weaning calf (d) and carcass composition. Similarly, their feed consumption adjusted for differences in gain and average body weight (Feed A) reflects variation in maintenance requirements per unit of time (part of b) and in converting feed consumed above maintenance into gain (a), but ignores feed and other costs which vary with time required per unit of gain (b and c) as well as (d). Also, its heritability is low.

Koch, et al. (1963) concluded that "selecting for (rate of) gain should be effective and lead to both increased feed efficiency (Gain A) and increased (daily) feed consumption. Such selection would increase daily feed consumption only to the extent necessary to achieve the more rapid gains in body weight, which in turn would reduce feed maintenance and other costs (b and c) which vary with time required to reach market weight. Selection for rate of gain would be more inclusive, of course, if adjusted for composition of gains and supplemented by selection for lower breeding herd overhead costs per pound of calves weaned (d). Whenever it is feasible to measure feed consumption, selection for lower feed consumption from weaning to a constant final weight (estimated), supplemented by selection for efficient reproduction and desired body composition, would seem the most nearly adequate approach.

* * *

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A NUTRITIONIST LOOKS AT FEED EFFICIENCY[1]

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At the 1962 meetings of the S-10 Technical Committee, Dr. E. J. Warwick stated that in the development of improved selection criteria and procedures the study of feed efficiency was likely to receive considerable emphasis. This is a significant statement, since the 1961-62 Annual Report contained little data on this important problem which has been of great importance to the livestock feeder for a long time.

Recently the Nebraska and Oklahoma Stations, together with the USDA, compiled results on 1324 bull and heifer calves which had been individually fed. Feed efficiency was defined as either the gain in body weight associated with a given feed intake or the feed required to produce a given amount of gain. Using the covariance technique, they concluded that efficiency expressed as gain adjusted for differences in feed consumption was the most accurate mathematical description and resulted in the highest heritability. Their study revealed a number of important nutritional principles which are often overlooked in expressing feed efficiency values and are, thus, causing errors in interpretation. It was encouraging to have these factors recognized. Specifically mentioned were the effect of nutritive value of the ration and that of differences in maintenance requirement. A further problem encountered was the curvilinearity of the relationship of increases in feed intake to weight gain and the possible effect of composition of the gain.

It is the purpose of the discussion today to point out some of the important items which affect the measurement of feed efficiency, to present a refinement for consideration, and finally to point out an area of research which could add to the accuracy of measuring feed efficiency. Although I know all will not agree with my approach, if it causes you to take a new look at the measurement of feed efficiency it will have achieved the purpose I have hoped for.

An example of the common procedure of reporting gains, feed consumption, and feed efficiency is presented in table 1. It is obvious that there are differences among these animals in feed consumption, daily gain, and in feed efficiency. If we were selecting on the basis of weight gain alone, we would rate the animals 1, 3, and 2 in order of decreasing gains. If, however, we consider gross efficiency alone, we would change the order to 3, 1, and 2, with number 3 being the most efficient in converting total feed to gain. A consideration

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[1]Paper presented at the S-10 Technical Committee meeting, June 16-19, 1963, Front Royal, Virginia.

of factors which affect feed efficiency may prove helpful in a little more critical analysis of data such as that presented in table 1.

TABLE 1. Feedlot Performance of Three Animals Fed the Same Ration

Item	Animal Number 1	2	3
Mean body weight, lb.	737	793	756
Daily feed consumed, lb.	18.5	16.1	16.1
Daily gain, lb.	2.18	1.55	2.07
Feed efficiency:			
Feed per pound of gain, lb.	8.49	10.39	7.78
Gain per 100 lb. of feed, lb.	11.8	9.6	12.9

Any factor which affects the measurement and accuracy of weight gain will also affect the measurement and accuracy of feed efficiency. Some of these factors are:

1. Fill (dressing percent)
2. Composition of weight gain (finish)
3. Nutritive value of the ration
4. Size or physiological age
5. Rate of gain
6. Feed intake

In a recent study with 10 steers on a restricted intake of a single ration, the reticulo-rumen contents, after a 12-hour stand without feed or water, varied from 34 to 60 pounds with a mean of 44. When a similar group was fed the same ration free choice, the fill ranged from 50 to 98 pounds with a mean of 71. A real attempt should be made to minimize the effect of fill. With animals which can be slaughtered at the termination of the feeding period, this can be done by using empty body weight, but with animals which must be kept alive, the effect of fill can be reduced by uniform shrink and weighing conditions. This effect is illustrated by the data in table 2.

TABLE 2. Effect of Fill on Weight Gains

Item	Hay	Pasture
Initial weight, lb.	638	634
Full weight, 87 days later, lb.	812	861
Shrunk weight next morning, lb.	765	818
Loss in weight overnight, lb.	47	43
Uncorrected daily gain, lb.	2.00	2.61
Corrected daily gain, lb.	1.46	2.11
Fill, percent of uncorrected gain	27	19

The effect of the fat content of the weight gain on feed efficiency is obvious. Fat requires more energy to put on than does lean. Consequently, more feed would be required unless there were some

compensating factors such as a lower maintenance requirement. Hence, it is suggested that when it is possible, body composition should be measured.

Although differences in ability to digest feeds is not felt to be a major factor in differences in feed efficiency among the animals, the nutritive value of the ration is a major factor. Extreme care should be taken to insure that feed efficiencies of animals fed different rations are not used for selection purposes.

All too often, the effect of size or physiological age is overlooked when considering feed efficiency. The older animal will usually require more energy per unit of gain and will, thus, have a lower feed efficiency than a younger animal of a similar genetic make-up. This effect is more important than usually realized.

The effect of rate of gain and feed intake is well known. It has been suggested that statistically adjusting gain to equal feed intake will overcome this difficulty. Animals can be fed for either equal feed consumption or for equal gain, and the animals making the most gain on equal feed or those using the least feed to make the same gain will automatically be the most efficient. These procedures, however, eliminate the possibility of the animal showing his ability to consume feed to his capacity.

The effect of maintenance requirement on feed efficiency is known, but little has been done about it. The nutrient requirements for gain above maintenance has hardly been touched with respect to feed efficiency. If progress is made in selecting animals which are more efficient utilizers of feed, it is important to know the reason for this increased efficiency since it will be of importance in evaluating the animal's potential on restricted or full feed. It is upon this problem that I will comment in more detail and present a proposal for your consideration. What can we tell from the example data in table 1? Which animal shall we select? How did their observed performance compare to that which was theoretically possible from the feed they consumed? We cannot tell too much about some of these questions, but we would be able to tell more if we could partition the feed use into maintenance and gain. In order to do this, we must work on a net energy (NE) basis. Thus, we must consider certain aspects of NE measurement and terminology.

NE can be expressed in three ways:

1. NE for maintenance alone (NE_m)
2. NE for gain alone (NE_p)
3. Total NE for maintenance and gain (NE_{m+p})

NE_m is measured by determining the heat production of animals at zero feed intake. By definition, the heat produced at zero feed intake is equal to the NE for maintenance. The quantity of feed which will just keep the animal in energy equilibrium will have an NE_m equal to the heat produced on no feed.

NE_p is measured by use of the "difference trial" technique in which the increase in energy retention caused by an increase in feed

intake is measured. If both levels of feeding are above maintenance, this increase in energy retention is the NE_p of that increase in feed.

NE_{m+p} is merely the sum of NE_m and NE_p when expressed on a total per day basis. If expressed per unit of feed, $NE_m > NE_{m+p} > NE_p$. The relationship of these three NE measures for alfalfa hay and for barley are shown in table 3.

TABLE 3. NE of Alfalfa Hay and Barley

	Megcal. per 100 lbs.		
	NE_m	NE_p	NE_{m+p}
Alfalfa hay	55.2	27.0	39.7
Barley	82.0	57.2	72.2
Alfalfa as percent of barley	67	47	55

It must be recognized that the values for NE_{m+p} are variable and those shown in the table were determined on free-choice feeding. At different levels on intake the values would be different.

In order for this type of information to aid in our measures of feed efficiency, we must have NE requirements expressed on this basis and we must re-evaluate our common feeds to allow the NE content to be expressed on this dual system. If we know the NE_m and NE_p for a feed and the NE requirements for maintenance alone and gain alone, we can calculate the NE_{m+p} at any level of feeding. Table 4 gives a summary of the recent California data on NE requirements of growing-finishing beef cattle. Table 5 shows a re-evaluation of a few common feeds as modified from Feeds and Feeding (F. B. Morrison, 21st ed.). With this data in hand we are now ready to take a second look at our three animals whose data are shown in table 1. This second look is presented in table 6. We are now able to tell much more about the efficiency of these animals assuming their maintenance requirement follows the normal pattern shown in table 4. On the basis of gross efficiency, animal 1 was considerably more efficient than animal 2. It is seen, however, that the partial efficiency of feed utilization for animals 1 and 2 is essentially the same. Animal 2, therefore, even though gaining considerably less than number 1, was just as efficient at converting feed above maintenance to weight gain. For some reason, he just did not eat sufficient to gain faster. Perhaps one should study relative feed capacity as it relates to gain and performance. Although this type of information may not change our selection procedure, it may help in explaining some of the differences. Animal 3, although gaining less than animal 1, was actually more efficient. This was shown in the gross efficiency figures. Actually, it would be very helpful if we could determine the maintenance and gain requirements for each animal being tested.

TABLE 4. Net Energy Requirements of Growing-Finishing Beef Cattle

Body weight (lb.)	NE required (megcal./day) For maintenance	For production/lb. of gain	Body weight (lb.)	NE required (megcal./day) For maintenance	For production/lb. of gain
400	3.58	1.58	800	6.02	2.65
425	3.74	1.65	825	6.16	2.71
450	3.91	1.72	850	6.30	2.77
475	4.07	1.79	875	6.43	2.83
500	4.23	1.86	900	6.57	2.89
525	4.39	1.93	925	6.71	2.95
550	4.54	2.00	950	6.84	3.01
575	4.70	2.07	975	6.98	3.07
600	4.85	2.13	1000	7.11	3.13
625	5.00	2.20	1025	7.25	3.19
650	5.15	2.27	1050	7.38	3.25
675	5.30	2.33	1075	7.51	3.30
700	5.44	2.39	1100	7.64	3.36
725	5.59	2.46	1125	7.77	3.42
750	5.73	2.52	1150	7.90	3.48
775	5.88	2.59	1175	8.03	3.53
			1200	8.16	3.59

TABLE 5. Net Energy Content of Feeds, As Fed
(modified from Feeds and Feeding, 21st ed.)

Feed	Megcal. per 100 lb. For maintenance (NE_m)	Megcal. per 100 lb. For wt. gain in addition to maintenance (NE_p)
Dry roughages		
Alfalfa hay, 25% fiber	60	29
Alfalfa hay, 28% fiber	55	26
Alfalfa hay, 34% fiber	46	22
Alfalfa meal, dehydrated, 20% protein	65	31
Barley hay	55	26
Barley straw	31	15
Bermuda grass hay	45	22
Cottonseed hulls	41	20
Prairie hay, good quality	51	24
Sudan grass hay	51	24
Silages		
Alfalfa, wilted	24	12
Corn, dent	28	13
Hegari	22	11
Sorghum, sweet	23	11
Sorghum, dual purpose	19	9
Concentrates		
Barley, 48 lb. per bu.	85	59
Barley, light weight	73	50
Beet pulp molasses, dried	84	58
Citrus pulp, dried	83	57
Corn, dent, No. 2	95	65
Corn and cob meal (ground ear corn)	85	59
Cottonseed, whole	95	65
Cottonseed meal, expeller, 41% protein	85	59
Cottonseed meal, solvent, 41% protein	75	52
Fat	170	117
Hegari grain	93	64
Hominy feed, 5% fat	101	70
Linseed meal, expeller	92	63
Linseed meal, solvent	85	59
Milo grain, Sacramento Valley, 60 lb.	95	65
Milo grain, Southwest	71	49
Molasses, 10% of ration	85	59
Oats	78	54
Potatoes, dried	84	58
Rice bran	67	46
Rice polishings	84	58
Screenings, grain, high quality	64	44
Soybean meal, expeller, 43% protein	95	65
Wheat mixed feed (mill run)	72	50
Whey, dried	96	66

TABLE 6. Partial Feed Efficiency of Three Animals

Item	Animal number 1	2	3
Mean body weight	737	793	756
NE required for maintenance, megcal./day	5.66	5.99	5.77
Feed required for maintenance, lb.[1]	7.7	8.2	7.9
Total feed consumed, lb.	18.5	16.1	16.1
Feed left for gain, lb.	10.8	7.9	8.2
Daily gain, lb.	2.18	1.55	2.07
Partial feed efficiency:			
Feed for gain per lb. of gain, lb.	5.0	5.1	4.0
Gain per 100 lb. of feed for gain, lb.	20.2	19.6	25.2
NE left for gain, megcal.[1]	5.18	3.79	3.94
NE required per lb. of gain, megcal.	2.49	2.63	2.53
Expected gain, lb.	2.08	1.44	1.56
Observed gain, lb.	2.18	1.55	2.07
Ratio, observed/expected	1.05	1.08	1.33

[1]Ration calculated to contain 73 megcal. per 100 lb. for maintenance and 48 megcal. per 100 lb. for gain above maintenance.

Now let us look at some S-10 data from this viewpoint. The information in table 7 was taken from the 1962 Annual Report. It will be noted that although the progeny of the high-gaining bull gained approximately 0.3 lb. more per day than those of the low-gaining bull, there was little difference in the feed efficiency.

TABLE 7. Performance by Sire, Breed, and Sex

	Mean body wt. (lb.)	Daily gain (lb.)	Daily feed (lb.)	Feed per lb. gain (lb.)
Sire:				
Low-gainer	760	2.08	19.88	9.6
High-gainer	807	2.36	22.35	9.5
Breed:				
Hereford	739	2.30	20.31	8.8
Hereford x Red Polled	833	2.14	21.81	10.2
Sex:				
Heifers	738	1.98	19.58	9.9
Steers	808	2.34	21.74	9.3

There appears, however, to be quite a difference in favor of the Hereford in the breed comparison and the steers in the sex comparison. The proposed refinement in the procedure is shown in table 8. There are only small differences in the partial efficiencies between sires and between sexes, but the small differences which do occur favor the low-gainer and the steers. In the case of the breed comparison, however, the Herefords still show considerably better feed utilization. Since there were some differences in sizes and since size may influence efficiency, it is beneficial to determine what influence the size may have in these comparisons. In the case of the sire comparison, the progeny of the high-gaining bull were 27 pounds heavier than those from the low-gainer. This resulted in the NE requirement per pound of gain being five percent higher than that of the low-gainer. Similarly, the feed required per pound of gain was approximately four percent higher for the high-gainer. It seems, therefore, that all the increased feed required per pound of gain for the high-gainer could be accounted for by the difference in size. In the case of the breed comparison, the larger crossbred cattle actually require nine percent more NE per pound of gain, and the feed required per 100 lb. of gain was 14 percent above that for Herefords. In this case, also, much of the increased feed required per pound of gain was accounted for by the difference in size. In the case of the sex comparisons, the steers required seven percent more NE per pound of gain but actually consumed less feed per pound of gain than the heifers. It appears, therefore, that for the sire and breed comparison the differences in size account for most of the differences in feed efficiency, but in the case of the sex comparison the larger size of the steers was more than offset by their greater efficiency in utilizing the feed left above maintenance.

TABLE 8. Partial Efficiency by Sire, Breed, and Sex

	Sire		Breed		Sex	
	Low	High	H'ford	HxRP	Heifer	Steer
NE for maintenance, megcal.	5.79	6.06	5.67	6.21	5.67	6.07
Feed for maintenance, lb. (76)	7.62	7.97	7.46	8.17	7.46	7.99
Feed consumed, lb.	19.88	22.35	20.31	21.81	19.58	21.74
Feed left for gain, lb.	12.26	14.38	12.85	13.64	12.12	13.75
Partial feed efficiency:						
Feed/lb. gain, lb.	5.9	6.1	5.6	6.4	6.1	5.9
Gain/100 lb. feed, lb.	17	16	18	15	16	17
NE left for gain, megcal. (51)	6.25	7.33	6.55	6.96	6.18	7.01
NE required/lb. gain, megcal.	2.55	2.67	2.50	2.73	2.50	2.67
Expected gain, lb.	2.45	2.75	2.62	2.55	2.47	2.63
Observed gain, lb.	2.08	2.36	2.30	2.14	1.98	2.34
Ratio, observed/expected	0.85	0.86	0.88	0.84	0.80	0.89
Ratio, NE required/lb. gain	1.00	1.05	1.00	1.09	1.00	1.07
Ratio, feed for gain/lb. gain	1.00	1.04	1.00	1.14	1.00	0.97

The basic assumption in this proposed analysis is that all animals have the same maintenance requirement per unit of metabolic body size. This is obviously not true for individual animals because of biological variation. The partitioning of the total requirements of bulls into maintenance and gain is an area in which I believe a new contribution can be made. It is not an easy problem, but one which can be done and should be considered.

A GENERAL STATEMENT OF POSITION REGARDING ANIMAL HUSBANDRY RESEARCH DIVISION AND BEEF CATTLE RESEARCH BRANCH PARTICIPATION IN REGIONAL PROJECTS[1]

E. J. Warwick[2]
U. S. Department of Agriculture

Our Division has been cooperating actively in three regional beef cattle breeding projects for periods of from 15 to 18 years, and the time may be opportune for restating the Division position and indicating changes which may be anticipated. The procedures, of course, conform to general policies of the U. S. Department of Agriculture's Agricultural Research Service in these matters.

First, it is a definite policy of the Agricultural Research Service of the United States Department of Agriculture to cooperate with State Experiment Stations in the conduct of regional projects. This position has been clearly set forth in Administrative Memorandum No. 110.3, dated 4/19/63, representing a revision of an earlier one from the Administrator's Office which read in part as follows:

> "It is Departmental policy to encourage wholehearted cooperation by its research divisions in regional research projects whenever, by reason of their experience, personnel, and facilities, such divisions are in a position to contribute to the planning and/or the prosecution of such regional projects. Divisions equipped to make significant contributions to regional projects will normally be invited to name representatives on the technical committees that guide the conduct of such projects. Such representatives shall prepare plans to coordinate pertinent work of their respective divisions with the regional projects as a whole and explore opportunities for effective cooperation in the over-all effort."

> "Department research divisions are authorized to:
> Commit themselves to participation in regional research projects whenever they are in a position to make a significant contribution to such projects. Contributions may take various forms including the supplying of useful data, providing assistance for coordination, furnishing technical advice and counsel, or assuming complete responsibility for a distinct phase of the regional effort."

Second, it is the unequivocal belief of personnel of the Beef Cattle Research Branch and the Animal Husbandry Research Division that problems of the kinds typified by beef cattle breeding are especially suited to the regional approach. It is our belief that the considerable body of knowledge regarding beef cattle breeding now available would in all

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[1]Paper presented at the S-10 Technical Committee meeting, June 16-19, 1963, Front Royal, Virginia.

[2]Chief, Beef Cattle Research Branch, Animal Husbandry Research Division, ARS, Beltsville, Maryland.

likelihood not be available had the regional approach not been inaugurated in the 1940's.

Coming now to more specific aspects, I would like to discuss our participation in these projects and indicate some possible future trends in this participation.

At the inception of the three regional beef cattle projects, it was jointly decided that a major contribution of our Division would be that of providing a Coordinator for each project. Although I was not a party to these original discussions, I believe the basic ideas were that the Coordinators would function in a number of ways, including (1) taking care of various administrative aspects of the project such as preparation of annual reports, making arrangements for annual meetings, circulating copies of projects for approval, etc.; (2) serving as an arm of the Administrative Advisor in maintaining liaison with the regional association of Directors and with the U. S. Department of Agriculture; (3) presenting facts and results of the project to the public and in other ways maintaining contact and liaison with industry; (4) counseling with State project leaders and Federal field station personnel regarding the technical aspects of projects being developed and in operation; (5) counseling with State and Federal personnel regarding the analysis and publication of data from contributing projects; and (6) summarizing data and preparing publications on a region-wide basis where such combination and summarization appeared most desirable for arriving at answers desired.

The Division also included the beef cattle breeding research done at its six field stations (each operated cooperatively with the state in which it is located) as parts of the regional breeding projects.

In addition, the Division made certain monies available under either cooperative agreements or memoranda of understanding to initiate and support cooperative research at many of the State stations having contributing projects in regional projects. At the time the regional projects were initiated, it was believed that Congress would add increments to Research and Marketing Act funds and that both the Department and the states would look forward to substantial additional funds. As I understand it, what was envisaged at that time was a true partnership in which the Division would use its funds to substantially support particular research projects in the States to augment the funds the States themselves were putting into the work.

Thus, the thinking was that as more funds for this work became available to the Division that additional support would be added to ongoing projects, as the progress of the projects justified.

So much for the original plans in regard to Divisional cooperation in the three regional projects. I believe it is fitting that we take a look at what has been done in these regards and what the future looks like insofar as we can see it at this time.

The three Coordinator positions were established and have, I believe, over the years functioned essentially as originally envisioned. In general, they have apparently functioned to the satisfaction of most persons concerned. When vacancies have occurred from time to time, the question has been reopened as to whether the position should be refilled or whether the available funds might be more effectively used in other ways. Agreement has not been unamious on this, but in each case the overwhelming sentiment among both State and Federal people involved has been that the Coordinator positions are worthwhile and represent a useful expenditure of money. Thus, they have been continued up to the present time. Some changes in function have occurred and others seem to be desirable in the future. First, the Coordinators have been given increased responsibilities for direct participation in and for leadership of the Beef Cattle Breeding projects at the federally owned stations. Second, it has for some time been our feeling that with the developmental stages of the original projects largely completed, Coordinators would need to spend less time in travel and promotional activities of various kinds with the result that more time should be available for personal research and for research involving the summarization of data from two or more stations in the region when this approach is agreed upon by the technical committee. It is our thinking that Coordinators can be most useful and effective if this trend continues. With this thought in mind, we have within the past year changed their titles from "Coordinator" to "Investigations Leader" since we believe this term more adequately describes their present functions. I want to emphasize that these are merely the official U. S. Department of Agriculture titles and that State personnel are at perfect liberty to continue considering them as Coordinators.

Beef Cattle Research projects at the federally owned field stations have continued to be parts of regional projects as originally planned, and I see no reason to anticipate that this will not continue to be the case in the future.

The third aspect of cooperation, namely the assignment of Federal funds to cooperating State Experiment Stations for carrying on cooperative research, has been the least satisfactory of the three avenues of cooperation originally planned. The anticipated increments to the Research and Marketing Act funds were not appropriated with the result that funds available for cooperative research have from the very beginning been extremely limited. During the same period costs of doing research have increased and it has been necessary in a few cases for the Department to reduce its support to cooperating states in order to maintain other aspects of the cooperative program. The net result is that we are putting relatively small sums of money into cooperative research at a fairly large number of State Experiment Stations. I trust that even these relatively small amounts have been useful to the stations involved, but I believe you will all agree that the allocation of sums of from $1800 to $6000 into a State project usually represents a relatively small part of the total input and is far from being a true partnership type of situation.

Situations of this kind, not only in the Animal Husbandry Research Division but in others within the Agricultural Research Service as well, have been critically examined in recent years, and it is the general

policy that Federal funds can be more effectively used if they are consolidated at fewer locations where the Federal contribution would be substantial and where a true partnership situation would be feasible. Limited though these funds are, we still want to keep them in the various regions and to make the most effective use of them possible. There is the very real possibility that within each region they may, in the future, be concentrated at some one, or certainly not more than two or three locations where work can be done of a kind which definitely serves the entire region. It would appear that such things as test stations where lines of cattle developed at several stations and the breeding system used in their development could be evaluated under standard conditions would be one such valid use for these funds. Development of such things as blood typing labs to serve the region, frozen semen repositories, development and maintenance of control herds, etc. are other things that would fit in this general category.

It is not our intention to make immediate drastic changes in these regards but on the other hand, all of you should recognize that over the next several years we are likely to be moving in the direction of consolidation of these funds at a limited number of locations. We trust this can be done without disruption of present contributions of States to regional projects and that the end result will be a more effective contribution on our part. It should also be realized that if additional Federal appropriations for Beef Cattle Research are not forthcoming for the continually increasing costs of carrying on other activities including the maintenance of a Coordinator in each region and the support of federally owned stations, it may be necessary to transfer all or part of the funds now going to States for cooperative work to these activities in order to maintain them. I hope this will not be necessary, but we might as well be realistic and realize that it may be. As matters now stand we have to say that these two activities have higher priorities than the allocation of funds to States for cooperative work in view of the distinctly unequal financial partnership situation we presently have in most of these situations.

In conclusion, I would like to reiterate that we in the Department feel the regional approach has been effective in Beef Cattle Breeding Research, is likely to be even more so in the future, and that the joint participation of our organization and the State Experiment Stations represents a desirable arrangement which should continue on a partnership basis. In view of the long-time nature of much of our work, it is certain that research in beef cattle breeding will need to continue for many more years if we are to effectively serve the industry.

TABLE 1. Cattle Inventory and Percent Used in S-10 Contributing Projects
July 1, 1963

tate	Cows Two Years and Over	Yearling Heifers	Bulls and Steers Under 1 yr.	Heifers Under 1 yr.	Bulls Over 1 yr.	Steers Over 1 yr.	Total Number	Percent used in Project
labama	417	36	159	155	24	18	809	100
rkansas	316	88	145	114	46		709	100
lorida	3241	901	1053	1053	166	755	7169	50.5
eorgia	773	194	324	270	41	52	1654	94.3
entucky	115	5	24	22	6		172	100
ouisiana	361	106	125	109	20	2	723	100
ississippi	804	132	314	313	32	229	1824	56
orth Carolina	269	79	102	94	6	66	616	89.9
outh Carolina	197	47	74	79	18		415	50
ennessee	1477	322	688	510	151	110	3258	100
exas	437	86	170	176	44	43	956	100
irginia	130	0	62	55	6		253	100
Total	8537	1996	3240	2950	560	1275	13,558	
ederal-State Cooperative Stations:								
rooksville, lorida	329	89	103	121	56		698	100
eanerette, ouisiana	287	51	101	90	44		573	100
ront Royal, irginia	436	122	152	154	51		915	100
Total	1052	262	356	365	151		2186	
otal	9589	2258	3596	3315	711	1275	20,744	

TABLE 2. Regional Research and Animal Husbandry Research Division Funds Allocated to Contributing S-10 Projects for 1963 Fiscal Year

State	Regional Research Funds	AHRD Funds
Alabama	19,830.00	2,400.00
Arkansas	12,000.00	3,000.00
Florida	3,300.00	2,500.00
Georgia	6,250.00	4,940.00
Kentucky	10,800.00	
Louisiana	6,500.00	
Mississippi	9,000.00	2,400.00
North Carolina	11,000.00	1,800.00
South Carolina		
Tennessee	12,000.00	13,600.00
Texas	10,000.00	8,400.00
Virginia	9,500.00	6,100.00
West Virginia		
Total	110,180.00	45,140.00

TABLE 3. Summary of Cow Performance for S-10 Herds by Breed for 1962

Breed	Total number exposed	No. of calves born	No. of calves weaned	Percent calving B/E	Weaning percent W/E	Percent raised W/B	Av. birth weight	Adj. ADG	Av. type score
Angus	1289	1069	935	82.9	72.5	87.4	60.2	1.76	11.5
Hereford	2190	1805	1616	82.4	73.7	89.5	69.3	1.68	11.1
Shorthorn	205	156	137	76.1	66.8	87.8	67.2	1.68	11.4
Africander-Angus	36	32	30	88.9	83.3	93.7	68.0	1.46	8.6
Brahman	195	146	126	74.8	64.6	86.3	61.8	1.71	7.6
Brangus	100	78	69	78.0	69.0	88.4	68.0	1.68	9.3
Charbray	17	17	14	100.0	82.3	82.3	92.2	2.96	
Charolais	57	35	32	61.4	56.1	91.4	83.5	2.51	11.1
Santa Gertrudis	96	76	65	77.9	67.7	85.5	74.2	1.93	9.8
Angus x Straightbred	101	82	79	81.1	78.2	96.3	60.5	1.63	11.0
Hereford x Straightbred	57	47	47	82.5	82.5	100.0	68.2	1.59	11.7
Shorthorn x Straight-bred	57	36	36	63.1	63.1	100.0	64.5	1.78	11.2
Brahman x Straightbred	78	49	46	62.8	58.9	93.8	70.7	1.68	9.5
Angus x Two-breed cross	143	129	119	90.2	83.2	92.2	59.8	1.72	10.7
Hereford x Two-breed cross	164	152	149	92.6	90.8	98.0	66.4	1.86	11.1
Shorthorn x Two-breed cross	124	95	92	76.6	74.2	96.8	68.1	1.81	10.5
Brahman x Two-breed cross	230	180	167	78.2	72.6	92.7	72.0	1.93	10.3
Santa Gertrudis x Two-breed cross	84	76	70	90.4	83.3	92.1	78.3	2.43	10.7
Crossbreds	466	363	339	77.9	72.7	93.4	72.8	1.86	10.1
Average	5689	4623	4168	81.3	73.3	90.2	67.2	1.76	11.0

TABLE 4. Summary of Cow Performance for S-10 Herds by States and Federal Stations for 1962

State or station	Total number exposed	No. of calves born	Calving percent	No. of calves weaned	Weaning percent W/E	Percent raised W/B	Av. birth weight	Adj. ADG	Av. type score
Alabama	347	270	63.8	263	75.8	97.4	63.7	1.61	11.7
Arkansas	381	311	81.6	284	74.5	91.3	62.8	1.67	11.6
Florida	812	654	80.5	621	76.5	94.9	61.8	1.85	10.3
Georgia	667	537	80.5	519	77.8	96.6	70.8	1.51	10.8
Kentucky									
Louisiana	363	267	73.6	249	68.6	93.3	71.6	1.70	11.2
Mississippi	262	234	89.3	221	84.4	94.4	69.1	1.66	11.0
North Carolina	235	169	71.9	154	65.5	91.1	63.8	1.65	10.0
South Carolina	196	161	82.1	138	70.4	85.7	66.2	1.81	11.0
Tennessee	841	742	88.2	613	72.9	82.6	67.3	1.76	11.7
Texas	391	338	86.4	303	77.5	89.6	76.7	2.39	
Virginia	73	70	95.9	67	91.8	95.7	63.0	1.95	11.8
West Virginia	169	122	75.8	112	69.6	91.8		1.50	10.7
Brooksville, Florida	246	213	86.6	157	63.8	73.7	65.9	1.83	11.4
Jeanerette, Louisiana	252	196	77.8	181	71.8	92.3	66.1	1.61	9.6
Front Royal, Virginia	462	339	73.3	286	61.9	84.4	64.4	1.83	11.7
Average	5689	4623	81.3	4168	73.3	90.2	67.2	1.76	11.0

TABLE 5. Summary of Postweaning Performance for S-10 Herds by Breed for 1962

Breed	No. of animals	Av. initial age	Av. initial weight	No. of days on feed	Av. final weight	ADG	Av. type score	Av. cond. score
Angus bulls	159	246	508	165	859	2.20	11.6	11.3
Angus steers	98	251	476	199	770	1.47	11.4	10.0
Angus x straightbred steers	34	243	439	206	835	1.92	8.6	10.4
Angus x 2-breed cross steers	27	264	500	181	834	1.95	11.5	11.5
Angus heifers	157	250	441	176	620	1.09	11.4	8.8
Angus x straightbred heifers	15	337	453	142	726	1.96	11.8	9.0
Angus x 2-breed cross heifers	9	296	418	152	715	1.96	11.6	9.0
Averages and/or totals	499	253	472	178	757	1.66	11.3	10.1
Hereford bulls	181	239	494	165	830	2.40	11.3	9.9
Hereford steers	170	288	457	239	878	1.88	10.9	10.2
Hereford x straightbred steers	27	260	562	213	982	2.10	11.0	11.2
Hereford x 2-breed cross steers	24	274	565	143	955	2.10	12.4	10.8
Hereford heifers	116	239	405	170	615	1.36	10.1	10.5
Hereford x straightbred heifers	11	302	577	168	904	1.98	11.1	
Hereford x 2-breed cross heifers	6	276	510	120	794	2.11	12.0	
Averages and/or totals	535	259	471	191	813	1.97	10.9	10.2
Shorthorn bulls	23	245	521	155	915	2.54	12.2	10.6
Shorthorn steers	20	251	447	217	843	1.90	11.8	11.3
Shorthorn x straightbred steers	14	220	463	216	845	1.77		11.2
Shorthorn heifers	37	263	419	138	612	1.41	11.8	8.7
Shorthorn x straightbred heifers	5	352	476	120	732	2.14	10.8	
Shorthorn x 2-breed cross heifers	3	354	503	120	726	1.90	11.3	
Averages and/or totals	102	258	459	167	767	1.86	11.8	10.1
Santa Gertrudis bulls	6	209	564	366	1177	1.67	9.1	11.5
Santa Gertrudis steers	8	334	489	235	931	1.89		8.6
S. G. x straightbred steers	3	225	627	140	940	230		
S. G. x 2-breed cross steers	29	249	592	168	923	2.19	11.0	9.8
Santa Gertrudis heifers	15	214	476	366	832	0.87		9.0
S. G. x 2-breed cross heifers	24	233	512	140	682	1.20		
Averages and/or totals	85	243	539	214	858	1.62	10.7	9.8

TABLE 5. Continued

Breed	No. of animals	Av. initial age	Av. initial weight	No. of days on feed	Av. final weight	ADG	Av. type score	Av. cond. score
Brahman bulls	13	228	494	269	884	2.03	9.2	9.4
Brahman steers	7	224	320	196	676	1.90	7.5	7.5
Brahman x straightbred steers	19	180	445	209	823	1.82	8.9	8.8
Brahman x 2-breed cross steers	17	239	553	170	865	2.00	9.8	10.1
Brahman heifers	18	229	430	366	670	1.31		8.0
Brahman x straightbred heifers	4	238	370	168	675	1.81		7.5
Brahman x 2-breed cross heifers	16	234	434	154	660	1.54		6.6
Averages and/or totals	94	222	454	228	765	1.74	9.1	8.4
Brangus bulls	10	245	488	140	864	2.69	9.8	9.2
Brangus steers	12	249	414	196	832	2.13	8.5	9.0
Brangus x straightbred steers	18	230	481	216	895	1.91		10.2
Averages and/or totals	40	239	463	166	868	2.17	9.1	9.6
Crossbred bulls	18	229	346	157	990	2.68	10.2	9.6
Crossbred steers	306	361	556	186	919	1.98	11.7	9.9
Crossbred heifers	180	257	485	185	768	1.74	12.4	9.7
Averages and/or totals	504	319	523	185	868	1.92	11.9	9.8
	1859	270	487	187	811	1.84	11.2	9.9

Station Reports

AUBURN UNIVERSITY
Agricultural Experiment Station

I. PROJECT: Animal Science 525, AH Line Project d1-29 (S-10)

The Improvement of the Beef Cattle of Alabama Through Breeding Methods

II. OBJECTIVES:

To determine the effectiveness of mass selection for total performance in beef cattle.

To develop criteria for evaluating and selecting breeding animals.

To study the influence of heterosis in crosses between the three British breeds of beef cattle.

III. PERSONNEL:

Troy B. Patterson, George B. Meadows, and W. M. Warren

IV. ACCOMPLISHMENTS DURING THE YEAR:

1. Scope and nature of work

Facilities include 950 acres, 600 acres of which are in improved pasture or hay meadows. Paddocks are available for group feeding 150 bulls, 150 heifers, and 100 steers. In addition, lots are available for group feeding sire progeny groups of 40 calves each. A new feed processing unit has been added so that processing of feed for these groups is no longer a problem.

A total of 252 brood cows, 36 replacement heifers, and 20 herd bulls are currently in use on various phases of the project. Of the above females, 173 (75 Angus, 70 Hereford, and 28 Shorthorn) are used on the purebred selection phase. The remaining 79 head (13 Angus, 12 Herefords, 13 Shorthorns, and 41 crossbreds) are used on the crossbreeding phase. The 20 bulls include nine Angus, eight Herefords, and three Shorthorns.

In addition to the above, 165 grade cows of predominately Hereford breeding which are located at two substations are used in support of the research at the main station.

2. Research results

The long generation interval in cattle has limited the output of this experiment in terms of new and significant results. Because of the effects of uncontrolled environmental influences several generations

are required to accurately evaluate a selection procedure. Only a limited number of second generation females are in production at present, while the largest part of the herd is composed of foundation cows and their daughters. Young bulls saved from the herd offer potential for rapid improvement. Also, comparisons are being made between bulls raised on the station and bulls purchased from various breeders.

Data collected on the calves in the purebred herds include birth weight, 180-day weight and score, 250-day weight and score, post-weaning performance, and conformation score at the end of the post-weaning test. Heifer replacement selection is based on an index giving equal emphasis to weaning weight, post-weaning gain, and conformation score.

Four years' data have been completed for the first phase of the crossbreeding study. These data are presented in Table 1. Crossbred steers weaned heavier (41 lb.), were heavier at the end of the feed lot (84 lb.), produced carcasses that were 54 lbs. heavier, graded one-third of a grade higher, and were fatter than the purebreds. There was no difference between the means of the two groups in adjusted rib eye per 100 lbs. carcass.

TABLE 1. Crossbreeding Among British Breeds - Steer Data
Four-Year Average (1957 through 1960)

	No. Steers	Adj. Weaned Weight (lb.)	Weaned Grade	ADG (lb.)	Final Wt. (lb.)	Chilled Carcass Weight (lb.)	Carcass Grade (Fed.)	Fat Thick-ness (in.)	Adj. Rib eye/100 lbs. (sq.in.)	Dressing Percent
Cross-breds	49	484.5	10.6	1.99	986.8	602.2	12.7	0.73	2.13	61.0
Pure-breds	47	443.6	10.3	1.93	902.6	547.8	12.0	0.64	2.16	60.7
Differ-ence	2	40.9	0.3	0.06	84.2	54.4	0.7	0.09	-0.03	0.3

Crossbred heifers weaned heavier than purebred heifers (Table 2), but did not gain faster in the feed lot. There was no difference in conformation score between the two groups.

TABLE 2. Crossbreeding Among British Breeds - Heifer Data
Five-Year Average (1957 through 1961)

	No. Heifers	Birth Weight (lb.)	Adjusted Weaning Weight (lb.)	ADG Test (lb.)	Conforma-tion Score
Crossbreds	58	63.1	467.7	1.77	11.8
Purebreds	62	60.6	444.6	1.77	11.8
Difference	- 4	2.5	23.1	0.0	0.0

A limited amount of data is available from the second phase of the crossbreeding study. These data are presented in Tables 3 and 4. Up to weaning, three-way cross steers and heifers out performed the two-way cross calves. Since heterosis is the same in both groups of calves, the extra response may be attributed to heterosis in the dam.

TABLE 3. Comparison of Two-Way and Three-Way Cross Steers
(1 yr. Weaning Data Only)

	No. Steers	Birth Weight (lb.)	Adjusted Weaning Weight (lb.)	Conformation Score
Three-way Cross	12	66.2	477.1	8.2
Two-way Cross	5	68.5	444.6	7.7
Difference		- 2.3	32.5	0.5

TABLE 4. Comparison of Two-way and Three-way Cross Heifers
(1 year only)

	No. Heifers	Birth Weight (lb.)	Adjusted Weaning Weight (lb.)	ADG (lb.)	Conformation Score
Three-way Cross	8	60.1	494.2	2.01	11.6
Two-way Cross	7	59.6	483.2	2.07	11.3
Difference		0.5	11.0	-0.06	0.3

The final set of first phase crossbred steers is on feed now. These data, when complete, will terminate this portion of the cross-breeding program.

In support of this project studies were designed to test the effectiveness of selection based on performance test information. High and low gaining Hereford and Angus bulls have been retained from the performance test for use in this study. These bulls have been bred to comparable groups of cows which were divided on the basis of previous production and breed. Data collected on the progeny of these bulls include weaning weight and grade at each of two locations and post-weaning performance at one location. A summary of the principle results to date is presented in Tables 5, 6, and 7.

TABLE 5. Performance Records of Sires and Progeny - Tuskegee Field
Three-Year Average (1959 through 1961)

	Number	Birth Weight (lb.)	Weaning[1] Weight (lb.)	Grade
High-gaining Sire	3	84	598	12.0
Low-gaining Sire	3	74	473	12.0
Difference	-	10	125	0.0
High Progeny	55	70	503	8.5
Low Progeny	52	69	483	8.0
Difference	3	1	20	0.5

[1]Adjusted to 250 days, steer equivalent, and mature dam.

TABLE 6. Performance Records of Sires and Progeny - Upper Coastal Plain Substation
Three-Year Average (1959 through 1961)

	Number	Birth Weight (lb.)	Weaning[1] Weight (lb.)	Grade
High-gaining Sire	6	71	557	12.0
Low-gaining Sire	6	59	509	12.5
Difference	-	12	48	- 0.5
High Progeny	99	63	521	7.5
Low Progeny	91	60	506	7.8
Difference	8	3	15	- 0.3

[1]Adjusted to 300 days, steer equivalent, and mature dam.

TABLE 7. Post-weaning Performance of Calves Sired by Performance
Tested Bulls - Upper Coastal Plain Substation
Three-Year Average (1960 through 1962)

	Number	ADG on Test	Final Weight (lb.)	Grade
High-gaining Sire	6	2.53	1104	11.8
Low-gaining Sire	6	1.86	946	12.3
Difference	-	0.67	158	- 0.5
High Progeny	79[1]	2.05	839	10.0
Low Progeny	91	1.89	803	10.1
Difference	-	0.16	36	- 0.1

[1]High-gaining heifers were retained for replacements and were not included in the feed lot period.

3. Conclusions

(1) Crossbred steers weaned heavier, gained faster, and produced heavier carcasses which graded higher than purebred steers.

(2) When fed to a constant age, the crossbred steers were fatter but there was no indication of extra meatiness as measured by square inches of rib eye per 100 lbs. carcass.

(3) Crossbred heifers weaned heavier than purebred heifers, but did not gain faster in the feed lot.

(4) Limited data indicate that crossbred dams are better mother cows than are purebred dams.

(5) Data collected over a three-year period indicate that the performance of bulls on test is a reliable estimate of their relative breeding merit.

V. FUTURE PLANS:

The project will be continued as outlined. The first phase of the crossbreeding study will be terminated.

VI. PUBLICATIONS:

Patterson, T. B. and W. W. Cotney. 1962. Performance tested bulls sire high quality calves. Highlights of Agricultural Research, Vol. 9, No. 3.

VII. PUBLICATIONS PLANNED:

Station bulletin on the first phase of the crossbreeding.

Submitted by: Troy B. Patterson

I. PROJECT: Animal Science 525-1 (S-10)

A Comparison of Crossbreeding and Within-Breed Selection on Beef Cattle Production in the Black Belt Area of Alabama

II. OBJECTIVES:

To evaluate the significance of hybrid vigor in various crosses of beef cattle with regard to production of slaughter calves, stocker or feeder steers, and slaughter steers.

To determine the effect of heterosis on mothering ability, adaptability, and fertility.

To determine the most economical method of finishing steer calves that are dropped in the spring from the above system.

III. PERSONNEL:

Troy B. Patterson, L. A. Smith, and Harold Grimes

IV. ACCOMPLISHMENTS DURING THE YEAR:

1. Scope and nature of work

Sixty brood cows, 20 of which are first-cross Brahman x Herefords and 40 of which are high grade Herefords, have been devoted to the first phase of this test. Since these were mature cows initially, several have been removed under standard management procedures. Whenever possible, cows of similar breeding have been used as replacements. Despite this effort, fewer numbers were available for the last two years of the test. Matings were made to produce approximately equal numbers of Hereford, Angus x Hereford, and 3/4 Hereford-1/4 Brahman calves.

Randomly selected females from these breeding groups were retained for use in the second phase of the study. These heifers are being bred as follows:

Bull	Cow	Offspring
Hereford	Hereford	Hereford
Hereford	1/2 Angus-1/2 Hereford	3/4 Hereford-1/4 Angus
Angus	1/2 Angus-1/2 Hereford	3/4 Angus-1/4 Hereford
Hereford	3/4 Hereford-1/4 Brahman	7/8 Hereford-1/8 Brahman

In addition to weaning information on all calves, post-weaning performance and carcass evaluations are being obtained on all steers.

2. Research results

A two-year summary of the results obtained from the second phase of this study is given in Table 1. Since this study is just getting underway, no inferences are made and no conclusions are drawn from these data.

TABLE 1. Two-Year Average by Breed of Calf, 1960-61 and 1961-62 (Phase 2)

Breed of Calf	Number	Adjusted[1] Birth Weight	Adjusted[1] Weaning Weight	Adjusted[1] ADG	Grade	Value Per Calf	Percent Calf Crop
H x H	23	64.1	454.0	1.53	8.2	$109.30	79.3
3/4H-1/4A	13	64.2	498.5	1.70	9.4	120.18	92.9
3/4A-1/4H	12	63.6	478.4	1.63	9.6	118.75	92.3
7/8H-1/8B	24	65.8	478.7	1.62	8.5	114.06	92.3

[1] Adjusted to mature dam, steer equivalent, and 255 days.

Post-weaning performance for the 1961-62 steers is presented elsewhere in this report and will not be repeated here.

V. FUTURE PLANS:

Phase 2 will be continued for the life of the brood cows included.

VI. PUBLICATIONS:

Station mimeograph

VII. PUBLICATIONS PLANNED:

Station bulletin

Submitted by: Troy B. Patterson

FORM I
COW PRODUCTION, 1962 CALF CROP

	Alabama			State		
Location	Auburn	Auburn	Auburn	Auburn	Auburn	Auburn
Breed of sire	Angus	Hereford	Shorthorn	Angus	Hereford	Shorthorn
Breed of dam	Angus	Hereford	Shorthorn	Angus	Hereford	Shorthorn
Line or group[1]	Purebred	Purebred	Purebred	Cross-breeding	Cross-breeding	Cross-breeding
No. cows exposed[2]	48	46	7	12	12	12
No. calves born[3]	30	29	5	11	8	9
Calving percent, born	62.5	63.0	71.4	91.7	66.7	75.0
Av. birth date	11/18/61	12/01/61	11/28/61	11/07/61	12/06/61	11/21/61
Av. birth wt.	58.3	66.5	61.8	59.8	65.9	65.9
No. calves weaned	29	29	4	10	8	9
Calving percent, weaned[4]	60.4	63.0	57.1	83.3	66.7	75.0
Av. weaning age, days	250	250	250	250	250	250
Adj. ADG[5]	1.69	1.74	1.64	1.59	1.53	1.38
Av. type score[6]	12.0	12.5	11.2	11.3	11.7	11.0
Av. condition score[6]	8.3	8.4	7.2	8.3	8.2	7.6

1 - Purebreds, grade, line, backcross, three-breed cross, treatment, etc.
2 - Total number put in breeding herd
3 - Total number born, dead + alive
4 - Number weaned, divided by number of cows exposed
5 - Indicate adjustments:

Mature dam
Steer equivalent
All weaned at 250 days

6 - 15, 16, and 17 = Fancy
12, 13, and 14 = Choice
9, 10, and 11 = Good
6, 7, and 8 = Medium

FORM I
COW PRODUCTION, 1962 CALF CROP

Alabama State

Location	Auburn	Auburn	Auburn	Auburn	Auburn	Auburn
Breed of sire	Angus	Angus	Hereford	Hereford	Shorthorn	Shorthorn
Breed of dam	H x S	S x H	A x S	S x A	A x H	H x A
Line or group[1]	Cross-breeding	Cross-breeding	Cross-breeding	Cross-breeding	Cross-breeding	Cross-breeding
No. cows exposed[2]	4	5	5	3	3	2
No. calves born[3]	3	5	4	3	3	2
Calving percent, born	75.0	100.0	80.0	100.0	100.0	100.0
Av. birth date	11/03/61	11/03/61	10/23/61	10/17/61	11/02/61	10/31/61
Av. birth wt.	61.0	65.8	63.0	72.0	58.3	61.0
No. calves weaned	3	5	4	3	3	2
Calving percent, weaned[4]	75.0	100.0	80.0	100.0	100.0	100.0
Av. weaning age, days	250	250	250	250	250	250
Adj. ADG[5]	1.47	1.72	1.66	1.74	1.74	1.78
Av.type score[6]	12.0	12.5	13.5	13.0	11.0	12.0
Av. condition score[6]	7.7	8.0	7.8	9.3	8.0	9.5

1 - Purebreds, grade, line, backcross, three-breed cross, treatment, etc.
2 - Total number put in breeding herd
3 - Total number born, dead + alive
4 - Number weaned, divided by number of cows exposed
5 - Indicate adjustments:

Mature dam
Steer equivalent
All weaned at 250 days

6 - 15, 16, and 17 = Fancy
12, 13, and 14 = Choice
9, 10, and 11 = Good
6, 7, and 8 = Medium

FORM I
COW PRODUCTION, 1962 CALF CROP

Alabama State

Location	Auburn	Auburn	Auburn	Auburn	Auburn	Auburn
Breed of sire	Angus	Angus	Hereford	Hereford	Shorthorn	Shorthorn
Breed of dam	Hereford	Shorthorn	Angus	Shorthorn	Angus	Hereford
Line or group[1]	Cross-breeding	Cross-breeding	Cross-breeding	Cross-breeding	Cross-breeding	Cross-breeding
No. cows exposed[2]	9	9	8	9	8	10
No. calves born[3]	6	5	7	7	7	7
Calving percent, born	66.7	55.6	87.5	77.8	87.5	70.0
Av. birth date	11/10/61	11/06/61	10/25/61	11/16/61	11/02/61	10/28/61
Av. birth wt.	63.4	57.0	65.4	68.6	63.0	69.3
No. calves weaned	5	5	7	7	7	7
Calving percent, weaned[4]	55.6	55.6	87.5	77.8	87.5	70.0
Av. weaning age, days	250	250	250	250	250	250
Adj. ADG[5]	1.60	1.76	1.73	1.71	1.64	1.57
Av. type score[6]	11.2	11.0	13.0	12.5	11.5	11.7
Av. condition score[6]	7.6	8.0	9.1	9.0	8.1	7.6

1 - Purebreds, grade, line, backcross, three-breed cross, treatment, etc.
2 - Total number put in breeding herd
3 - Total number born, dead + alive
4 - Number weaned, divided by number of cows exposed
5 - Indicate adjustments:

Mature dam
Steer equivalent
All weaned at 250 days

6 - 15, 16, and 17 = Fancy
12, 13, and 14 = Choice
9, 10, and 11 = Good
6, 7, and 8 = Medium

FORM I
COW PRODUCTION, 1962 CALF CROP

Alabama State

Location	Blackbelt	Blackbelt	Blackbelt	Blackbelt	Winfield	Winfield
Breed of sire	Hereford	Hereford	Angus	Hereford	Angus	Angus
Breed of dam	Hereford	1/2A-1/2H	1/2A-1/2H	3/4H-1/4B	Mixed	Mixed
Line or group[1]	Cross-breeding	Cross-breeding	Cross-breeding	Cross-breeding	High	Low
No. cows exposed[2]	18	8	9	18	22	20
No. calves born[3]	14	8	9	16	22	17
Calving per-cent, born	77.8	100.0	100.0	88.9	100.0	85.0
Av. birth date	10/23/61	10/01/61	11/29/61	11/07/61	10/09/61	10/21/61
Av. birth wt.	62.5	63.8	66.0	66.4	62.3	61.1
No. calves weaned	13	8	7	16	22	17
Calving per-cent, weaned[4]	72.2	100.0	77.8	88.9	100.0	85.0
Av. weaning age, days	258	267	250	250	296*	283*
Adj. ADG[5]	1.52	1.70	1.62	1.63	1.49	1.51
Av.type score[6]	10.9	10.7	12.0	10.3	-	-
Av. condition score[6]	8.8	9.4	10.6	8.9	7.2	7.3

1 - Purebreds, grade, line, backcross, three-breed cross, treatment, etc
2 - Total number put in breeding herd
3 - Total number born, dead + alive
4 - Number weaned, divided by number of cows exposed
5 - Indicate adjustments:

Mature dam
Steer equivalent
255 days
* 300 days

6 - 15, 16, and 17 = Fancy
12, 13, and 14 = Choice
9, 10, and 11 = Good
6, 7, and 8 = Medium

FORM I
COW PRODUCTION, 1962 CALF CROP

Alabama State

Location	Winfield	Winfield				
Breed of sire	Hereford	Hereford				
Breed of dam	Mixed	Mixed				
Line or group[1]	High	Low				
No. cows exposed[2]	20	20				
No. calves born[3]	17	16				
Calving percent, born	85	80				
Av. birth date	10/08/61	10/19/61				
Av. birth wt.	66.9	67.2				
No. calves weaned	17	16				
Calving percent, weaned[4]	85	80				
Av. weaning age, days	297	286				
Adj. ADG[5]	1.46	1.54				
Av. type score[6]	-	-				
Av. condition score[6]	7.3	8.2				

1 - Purebreds, grade, line, backcross, three-breed cross, treatment, etc.
2 - Total number put in breeding herd
3 - Total number born, dead + alive
4 - Number weaned, divided by number of cows exposed
5 - Indicate adjustments:

Mature dam
Steer equivalent
300 days weaning

6 - 15, 16, and 17 = Fancy
12, 13, and 14 = Choice
9, 10 and 11 = Good
6, 7, and 8 = Medium

FORM II
POSTWEANING PERFORMANCE OF CALVES FED IN 1962

Alabama State

	Location	Auburn	Auburn	Auburn	Auburn	Auburn	Auburn
	Breed of sire	Augns	Hereford	Shorthorn	Angus	Hereford	Shorthorn
	Breed of dam	Angus	Hereford	Shorthorn	Angus	Hereford	Shorthorn
	Line or group*	Purebred	Purebred	Purebred	Crossbred	Crossbred	Crossbred
Bulls	No. in group	13	14				
	Feed regime**						
	Av. init. age	345	318				
	Av. init. wt.	712	706				
	Av. no. da. fed	140	140				
	Av. final wt.	1021	1048				
	ADG on test	2.21	2.44				
	Av. type score	12.8	13.1				
	Av. cond. sc.						
	Av. inbreeding	0	0				
Heifers	No. in group	13	13	3	6	3	3
	Feed regime**						
	Av. init. age	345	334	347	369	322	325
	Av. init. wt.	450	451	434	458	426	460
	Av.no.da.fed	120	120	120	120	120	120
	Av. final wt.	704	689	677	699	662	676
	ADG on test	2.12	1.98	2.03	2.01	1.97	1.80
	Av. type score	11.1	11.9	11.7	11.0	12.0	12.0
	Av. cond. sc.						
	Av. inbreeding	0	0	0	0	0	0
Steers	No. in group				----- ON FEED -----		
	Feed regime**						
	Av. init. age						
	Av. init. wt.						
	Av.no.da.fed						
	Av. final wt.						
	ADG on test						
	Av. type score						
	Av. cond. sc.						
	Av. inbreeding						

* Show whether station-owned or cooperator-owned, in addition to other group designation.

** Feed regime:

	BULLS	HEIFERS	STEERS
How fed - full, limited, etc.	Full	Full	
Pounds/day over feeding period	27.7 lbs.	21.8 lbs.	
Ration:	Gr. snapped corn - 59% CSM (91%) - 10% Molasses - 10% Alfalfa meal - 03% Cottonseed hulls - 13% Johnsongrass hay - 04% Salt - 0.5% CDP - 0.5%	Gr. snapped corn - 24% CSM (41%) - 10% Molasses - 10% Alfalfa meal - 05% Johnsongrass hay - 10% Cottonseed hulls - 40% Salt - 0.5% CDP - 0.5%	

FORM II
POSTWEANING PERFORMANCE OF CALVES FED IN 1962

Alabama State

	Location	Auburn	Auburn	Auburn	Auburn	Auburn	Auburn
	Breed of sire	Angus	Angus	Hereford	Hereford	Shorthorn	Shorthorn
	Breed of dam	Hereford	Shorthorn	Angus	Shorthorn	Angus	Hereford
	Line or group*	Crossbred	Crossbred	Crossbred	Crossbred	Crossbred	Crossbred
Bulls	No. in group						
	Feed regime**						
	Av. init. age						
	Av. init. wt.						
	Av.no.da.fed						
	Av. final wt.						
	ADG on test						
	Av. type score						
	Av. cond. sc.						
	Av. inbreeding						
Heifers	No. in group	4	4	3	2	2	3
	Feed regime**						
	Av. init. age	350	352	350	315	346	356
	Av. init. wt.	468	472	494	520	388	535
	Av.no.da.fed	120	120	120	120	120	120
	Av. final wt.	742	724	727	810	605	817
	ADG on test	2.28	2.10	1.94	2.42	1.82	2.35
	Av. type score	11.8	11.8	12.3	10.5	11.0	10.7
	Av. cond. sc.						
	Av. inbreeding	0	0	0	0	0	0
Steers	No. in group	On feed	On feed	On feed	On feed	On feed	On feed
	Feed regime**						
	Av. init. age						
	Av. init. wt.						
	Av.no.da.fed						
	Av. final wt.						
	ADG on test						
	Av. type sc.						
	Av. cond. sc.						
	Av. inbreeding						

* Show whether station-owned or cooperator-owned, in addition to other group designation.

** Feed regime:

	BULLS	HEIFERS	STEERS
How fed - full, limited, etc.		Full	
Pounds/day over feeding period		21.8 lbs.	
Ration:		Gr. snapped corn - 24% CSM (41%) - 10% Molasses - 10% Alfalfa meal - 05% Johnsongrass hay - 10% Cottonseed hulls - 40% Salt - 0.5% CDP 0.5%	

FORM II
POSTWEANING PERFORMANCE OF CALVES FED IN 1962

Alabama State

Location		Auburn	Auburn	Auburn	Auburn	Auburn
Breed of sire		Angus	Angus	Hereford	Shorthorn	Shorthorn
Breed of dam		H x S	S x H	A x S	A x H	H x A
Line or group*		Crossbred	Crossbred	Crossbred	Crossbred	Crossbred
Bulls	No. in group					
	Feed regime**					
	Av. init. age					
	Av. init. wt.					
	Av.no.da.fed					
	Av. final wt.					
	ADG on test					
	Av. type sc.					
	Av. cond. sc.					
	Av. inbreeding					
Heifers	No. in group	1	2	2	2	1
	Feed regime**					
	Av. init. age	380	360	364	358	345
	Av. init. wt.	485	473	470	510	488
	Av.no.da.fed	120	120	120	120	120
	Av. final wt.	745	715	728	752	675
	ADG on test	2.17	2.02	2.15	2.02	1.56
	Av. type sc.	12.0	11.5	12.0	12.0	10.0
	Av. cond. sc.					
	Av. inbreeding	0	0	0	0	0
Steers	No. in group	On feed	On feed	On feed	On feed	On feed
	Feed regime**					
	Av. init. age					
	Av. init. wt.					
	Av.no.da.fed					
	Av. final wt.					
	ADG on test					
	Av. type sc.					
	Av. cond. sc.					
	Av. inbreeding					

* Show whether station-owned or cooperator-owned, in addition to other group designation.

** Feed regime:

	BULLS	HEIFERS	STEERS
How fed - full, limited, etc.		Full	
Pounds/day over feeding period		21.8 lbs.	
Ration:		Gr. snapped corn - 24% CSM (41%) - 10% Molasses - 10% Alfalfa meal - 05% Johnson-grass hay - 10% Cottonseed hulls - 40% Salt - 0.5% CDP - 0.5%	

FORM II
POSTWEANING PERFORMANCE OF CALVES FED IN 1962

Alabama
State

Location	Blackbelt	Blackbelt	Blackbelt	Blackbelt		
Breed of sire	Hereford	Hereford	Angus	Hereford		
Breed of dam	Hereford	1/2A-1/2H	1/2A-1/2H	3/4H-1/4B		
Line or group*	Crossbred	Crossbred	Crossbred	Crossbred		
Bulls: No. in group						
Bulls: Feed regime**						
Bulls: Av. init. age						
Bulls: Av. init. wt.						
Bulls: Av.no.da.fed						
Bulls: Av. final wt.						
Bulls: ADG on test						
Bulls: Av. type sc.						
Bulls: Av. cond. sc.						
Bulls: Av. inbreeding						
Heifers: No. in group						
Heifers: Feed regime**						
Heifers: Av. init. age						
Heifers: Av. init. wt.						
Heifers: Av.no.da.fed						
Heifers: Av. final wt.						
Heifers: ADG on test						
Heifers: Av. type sc.						
Heifers: Av. cond. sc.						
Heifers: Av. inbreeding						
Steers: No. in group	5	1	1	6		
Steers: Feed regime**						
Steers: Av. init. age	289	282	289	288		
Steers: Av. init. wt.	456	635	490	462		
Steers: Av.no.da.fed	227	227	227	227		
Steers: Av. final wt.	940	1150	925	959		
Steers: ADG on test	2.13	2.27	1.92	2.19		
Steers: Av. type sc.						
Steers: Av. cond. sc.	9.6	11.0	13.0	9.7		
Steers: Av. inbreeding	0	0	0	0		

* Show whether station-owned or cooperator owned, in addition to other group designation.

** Feed regime:

	BULLS	HEIFERS	STEERS
How fed - full, limited, etc.			Grazed 56 days, on pasture 39 days, full-fed 132 days
Pounds/day over feeding period			
Ration:			Grazing-Dallisgrass (poor) Fed on pasture-4 lbs. shelled corn/day Full feed: Cottonseed hulls - 23% Gr. ear corn - 56% Molasses - 10% CSM (41%) - 7.5% Urea - 1.5% Salt - 1.0% Minerals - 1.0%

FORM II
POSTWEANING PERFORMANCE OF CALVES FED IN 1962

Alabama State

Location	Winfield	Winfield	Winfield	Winfield		
Breed of sire	Angus	Angus	Hereford	Hereford		
Breed of dam	Mixed	Mixed	Mixed	Mixed		
Line or group*	High	Low	High	Low		
Bulls: No. in group						
Bulls: Feed regime**						
Bulls: Av. init. age						
Bulls: Av. init. wt.						
Bulls: Av.no.da.fed						
Bulls: Av. final wt.						
Bulls: ADG on test						
Bulls: Av. type sc.						
Bulls: Av. cond. sc.						
Bulls: Av. inbreeding						
Heifers: No. in group	14	8	9	5		
Heifers: Feed regime**						
Heifers: Av. init. age	391	368	386	378		
Heifers: Av. init. wt.	490	489	502	501		
Heifers: Av.no.da.fed	145	145	145	145		
Heifers: Av. final wt.	801	764	814	804		
Heifers: ADG on test	2.14	1.90	2.15	2.09		
Heifers: Av. type sc.						
Heifers: Av. cond. sc.	10.2	10.0	10.0	10.0		
Heifers: Av. inbreeding	0	0	0	0		
Steers: No. in group	8	9	8	11		
Steers: Feed regime**						
Steers: Av. init. age.	385	382	392	377		
Steers: Av. init. wt.	527	536	551	520		
Steers: Av.no.da.fed	145	145	145	145		
Steers: Av. final wt.	859	865	879	833		
Steers: ADG on test	2.29	2.27	2.26	2.16		
Steers: Av. type sc.						
Steers: Av. cond. sc.	9.6	10.3	9.6	8.6		
Steers: Av. inbreeding	0	0	0	0		

* Show whether station-owned or cooperator-owned, in addition to other group designation.

** Feed regime:

	BULLS	HEIFERS	STEERS
How fed - full, limited, etc.			
Pounds/day over feeding period			
Ration:		Gr. corn - 59% Alfalfa hay - 25% Cottonseed meal - 05% Molasses - 10% Salt - 01%	Ground corn - 59% Alfalfa hay - 25% Cottonseed meal - 05% Molasses - 10% Salt - 01%

FORM III
SLAUGHTER DATA, 1962

Alabama State

Location	Auburn	Auburn	Auburn	Auburn	Auburn	Auburn
Breed of sire	Angus	Hereford	Shorthorn	Angus	Angus	Hereford
Breed of dam	Angus	Hereford	Shorthorn	Hereford	Shorthorn	Angus
Line or group	Crossbreds	Crossbreds	Crossbreds	Crossbreds	Crossbreds	Crossbreds
Sex	Steers	Steers	Steers	Steers	Steers	Steers
Age at slaughter	549	564	554	574	554	543
No. slaughtered	1	5	2	2	2	1
Days in feedlot	229	229	229	229	229	229
Final feedlot wt.	875.0	975.0	892.5	935.0	860.0	860.0
Slaughter wt., live	875.0	975.0	892.5	935.0	860.0	860.0
Carcass wt., cold	534.0	582.0	535.0	578.6	524.3	522.0
Dressing percent, cold	61.0	59.7	59.8	61.8	61.0	60.7
Carcass grade, quality	14.0	12.8	14.0	12.5	13.0	13.0
Carcass grade, cutability	3.0	3.4	3.0	3.5	3.0	2.0
Est. percent, kidney fat	4.0	4.1	4.2	4.5	4.5	4.0
Rib-eye area/100 lbs. carcass	2.12	2.16	2.10	2.20	2.28	2.64
Marbling score						
Fat thickness over rib eye*	0.70	0.69	0.42	0.65	0.52	0.50
W-B shear force, pounds**	12.0	18.4	19.2	18.1	20.1	16.6

* Use one measure - if not, indicate method.

** Indicate size of core used and how meat was cooked.
Three one-inch core samples. Average of two readings per core.
Oven rib roast (7th rib) cooked to internal temperature of 155° ± 2.

FORM III
SLAUGHTER DATA, 1962

Alabama State

Location	Auburn	Auburn	Auburn			
Breed of sire	Hereford	Shorthorn	Shorthorn			
Breed of dam	Shorthorn	Angus	Hereford			
Line or group	Crossbred	Crossbred	Crossbred			
Sex	Steers	Steers	Steers			
Age at slaughter	569	610	554			
No. slaughtered	1	2	2			
Days in feedlot	229	229	229			
Final feedlot wt.	1030	1085	1067			
Slaughter wt., live	1030	1085	1067			
Carcass wt., cold	627.0	660.1	663.3			
Dressing percent, cold	60.9	60.8	62.1			
Carcass grade, quality	14.0	14.0	13.0			
Carcass grade, cutability	3.0	3.0	3.5			
Est. percent, kidney fat	5.0	4.0	5.2			
Rib-eye area/100 lbs. carcass	2.36	2.37	2.26			
Marbling score						
Fat thickness over rib eye*	0.65	0.65	0.70			
W-B shear force, pounds**	13.3	19.1	15.2			

* Use one measure - if not, indicate method.

** Indicate size of core used and how meat was cooked.

FORM III
SLAUGHTER DATA, 1962

Alabama State

Location	Blackbelt	Blackbelt	Blackbelt	Blackbelt	Winfield	Winfield
Breed of sire	Hereford	Hereford	Angus	Hereford	Hereford	Hereford
Breed of dam	Hereford	1/2A-1/2H	1/2A-1/2H	3/4H-1/4B	Mixed	Mixed
Line or group	Crossbred	Crossbred	Crossbred	Crossbred	High	Low
Sex	Steer	Steer	Steer	Steer	Heifer	Heifer
Age at slaughter	516	509	516	515	531	523
No. slaughtered	5	1	1	6	9	5
Days in feedlot	132	132	132	132	145	145
Final feedlot wt.	940	1150	925	959	814	804
Slaughter wt., live	902	1104	888	921	814	804
Carcass wt., cold	528	667	524	561	456	437
Dressing percent, cold	58.6	60.4	59.0	60.9	56.0	54.4
Carcass grade, quality	9.6	11.0	13.0	9.7	10.0	10.0
Carcass grade, cutability						
Est. percent kidney fat						
Rib-eye area/100 lbs. carcass	1.96	1.78	1.82	1.93		
Marbling score						
Fat thickness over rib eye*	0.55	1.10	0.50	0.64		
W-B shear force, pounds**						

* Use one measure - if not, indicate method.

** Indicate size of core used and how meat was cooked.

FORM III
SLAUGHTER DATA, 1962

Alabama State

Location	Winfield	Winfield	Winfield	Winfield	Winfield	Winfield
Breed of sire	Angus	Angus	Hereford	Hereford	Angus	Angus
Breed of dam	Mixed	Mixed	Mixed	Mixed	Mixed	Mixed
Line or group	High	Low	High	Low	High	Low
Sex	steer	steer	steer	steer	heifer	heifer
Age at slaughter	530	527	537	522	536	513
No. slaughtered	8	9	8	11	14	8
Days in feedlot	145	145	145	145	145	145
Final feedlot wt.	859	865	879	833	801	764
Slaughter wt., live	859	865	879	833	801	764
Carcass wt., cold	457	461	471	473	445	445
Dressing percent, cold	53.2	53.3	53.6	56.8	55.6	58.2
Carcass grade, quality	9.6	10.3	9.6	8.6	10.2	10.0
Carcass grade, cutability						
Est. percent kidney fat						
Rib-eye area/100 lbs. carcass						
Marbling score						
Fat thickness over rib eye*						
W-B shear force, pounds**						

* Use one measure - if not, indicate method.

** Indicate size of core used and how meat was cooked.

UNIVERSITY OF ARKANSAS
Agricultural Experiment Station

I. PROJECT: Hatch 170, AH Line Project d1-8 (S-10)

Evaluation of Performance Records of Beef Cattle

II. OBJECTIVES:

To continue to develop practical but adequate methods for identifying, evaluating, and propagating the genetic potential for the production of beef. This would involve determining the kind and number of performance records necessary to prove beef sires and dams, as well as the proper use of records in planning matings.

III. PERSONNEL:

C. J. Brown, Warren Gifford, R. S. Honea, J. E. Gage, N. G. Covington, and H. Williams

IV. ACCOMPLISHMENTS DURING THE YEAR:

As indicated in the accompanying summary sheets, Angus, Hereford, and Shorthorn herds were maintained at the Main Experiment Station at Fayetteville, and an Angus herd was maintained at the Livestock and Forestry Branch Station at Batesville. These herds were used to accumulate data on fertility, survival, growth, and lifetime development patterns as outlined in the project. Monthly weights and quarterly body measurement data were recorded on 797 young cattle. Semi-annual weights and measurements of 383 older cattle were taken. Type classification of all cattle by four judges, working independently, was recorded. Ninety-seven bulls were individually fed on performance test. However, heifers were group fed. Carcass cut-out and eating quality data were recorded on 49 bulls that had completed the performance test.

Analysis and evaluation of existing records were continued. A station bulletin dealing with the relationships of carcass characteristics and performance characteristics of bulls was prepared and is in the hands of the printers. The bulletin demonstrates that the bulls which had eaten more, gained faster, and had a heavier weight per day of age also had greater wholesale cut weights and yields. The larger, faster gaining bulls had a higher percentage of forequarter cuts. Correlations between feed conversion and wholesale cut weight and yield were low and, in general, negative, reflecting primarily size differences. Correlations between performance records and taste panel scores were low and of no value as predictors of eating quality. Larger rib-eye area was associated with faster gains and larger size, but was not associated with improved feed conversion, better type scores, increased yield of the higher-priced wholesale cuts, or in improved quality.

Least square estimates were obtained on post-weaning gains of 42 sire groups, including 408 performance-tested bull calves and 402 limited-fed heifer calves on pasture. These data indicated that sires could be ranked on the basis of the gains of their sons while on performance test, and on the basis of the gains of their daughters under limited feeding on pasture.

V. FUTURE PLANS:

Collection of data dealing with rate and efficiency of gain, visual appraisal, growth and development patterns, mothering ability, reproduction, and carcass value will be continued, according to the project outline. A study of heritability and genetic correlations of body measurements of cows will be completed. Comparison of the performance of sire and offspring will be made. Somascope readings will be correlated with carcass data. A study on feed conversion of performance test bulls will be completed.

VI. PUBLICATIONS:

Brown, C. J. and M. C. Gacula, Jr. 1962. Genotype-environment interactions in post-weaning rate of gain of beef cattle. Journal of Animal Science, 21:924.

Franks, L. E. 1963. A study of factors affecting size of three-year-old beef cows. Master's Thesis, University of Arkansas Library.

Gacula, M. C., Jr. 1963. Relationship of progeny performance to selection criteria of beef sires. Master's Thesis, University of Arkansas Library.

Gacula, M. C., Jr. 1963. Heritability of performance of beef bulls. Proceedings, Southern Section, American Society of Animal Science, 1963.

VII. PUBLICATIONS PLANNED:

Brown, C. J., P. K. Lewis, Jr., and M. C. Heck. 1963. The relationship of performance test information to carcass cut-out and eating quality of steaks from beef bulls (in press).

Paper on factors affecting cow size.

Paper on heritability of performance of beef bulls.

Submitted by: C. J. Brown

FORM I
COW PRODUCTION, 1962 CALF CROP

	Arkansas				State	
	(spring)	(fall)*	(spring)	(fall)*	(spring)	(fall)*
Location	Main Sta.	Main Sta.	Main Sta.	Main Sta.	Main Sta.	Main Sta.
Breed of sire	Hereford	Hereford	Angus	Angus	Shorthorn	Shorthorn
Breed of dam	Hereford	Hereford	Angus	Angus	Shorthorn	Shorthorn
Line or group[1]	Purebred	Purebred	Purebred	Purebred	Purebred	Purebred
No. cows exposed[2]	66	43	51	54	11	9
No. calves born[3]	51	43	40	50	9	7
Calving percent, born	77.3	100.0	78.4	92.6	81.8	77.8
Av. birth date	3/28/62	10/18/62	3/28/62	10/18/62	3/26/62	10/11/62
Av. birth wt.	66	71	62	63	65	68
No. calves weaned	47	38	38	47	9	7
Calving percent, weaned[4]	71.2	88.4	74.5	94.0	81.8	77.8
Av. weaning age, days	201	---	201	---	203	---
Adj. ADG[5]	2.04	1.31	2.21	1.30	1.33	---
Av. type score[6]	11.7	---	12.1	---	10.9	---
Av. condition score[6]						

1 - Purebreds, grade, line, backcross, three-breed cross, treatment, etc.
2 - Total number put in breeding herd
3 - Total number born, dead + alive
4 - Number weaned, divided by number of cows exposed
5 - Indicate adjustments:

$$\text{Average Daily Gain} = \frac{\text{weight - birth weight}}{\text{age in days}}$$

Weight was adjusted for sex and age of dam

6 - 15, 16, and 17 = Fancy
12, 13, and 14 = Choice
9, 10, and 11 = Good
6, 7, and 8 = Medium

* Data on fall calves are incomplete - data presented are through the fourth month.

FORM I
COW PRODUCTION, 1962 CALF CROP

	Arkansas				State	
	(spring)	(fall)*	(spring)	(fall)*	(spring)	(fall)*
Location	Main Sta.	Main Sta.	Main Sta.	Main Sta.	Main Sta.	Main Sta.
Breed of sire	Hereford	Hereford	Angus	Angus	Shorthorn	Shorthorn
Breed of dam	Hereford	Hereford	Angus	Angus	Shorthorn	Shorthorn
Line or group[1]	Purebred	Purebred	Purebred	Purebred	Purebred	Purebred
No. cows exposed[2]	10**	22**	13**	12**	5**	3**
No. calves born[3]	7	19	7	12	2	3
Calving percent, born	70.0	86.4	53.8	100.0	40.0	100.0
Av. birth date	3/27/62	10/04/62	3/20/62	10/16/62	3/16/62	10/24/62
Av. birth wt.	63	58	54	53	58	63
No. calves weaned	6	14	7	12	2	3
Calving percent, weaned[4]	60.0	73.7	53.8	100.0	40.0	100.0
Av. weaning age, days	204	-	209	-	213	-
Adj. ADG[5]	2.04	1.31	2.21	1.30	1.30	-
Av. type score[6]	10	-	10	-	9	-
Av. condition score[6]						

1 - Purebreds, grade, line, backcross, three-breed cross, treatment, etc.
2 - Total number put in breeding herd
3 - Total number born, dead + alive
4 - Number weaned, divided by number of cows exposed
5 - Indicate adjustments:

$$\text{Average Daily Gain} = \frac{\text{weight - birth weight}}{\text{age in days}}$$

Weight was adjusted for sex and age of dam

6 - 15, 16, and 17 = Fancy
12, 13, and 14 = Choice
9, 10, and 11 = Good
6, 7, and 8 = Medium

* Data on fall calves are incomplete - data presented are through the fourth month.
** First-calf heifers

FORM I
COW PRODUCTION, 1962 CALF CROP

	Arkansas				State	
	(spring)	(fall)*	(spring)	(fall)*		
Location	L-F Sta.	L-F Sta.	L-F Sta.	L-F Sta.		
Breed of sire	Angus	Angus	Angus	Angus		
Breed of dam	Angus	Angus	Angus	Angus		
Line or group[1]	Purebred	Purebred	Purebred	Purebred		
No. cows exposed[2]	27	39	9**	7**		
No. calves born[3]	21	30	7	3		
Calving percent, born	77.8	76.9	77.8	42.8		
Av. birth date	2/25/62	10/01/62	2/12/62	10/10/62		
Av. birth wt.	63	58	49	51		
No. calves weaned	21	25	5	3		
Calving percent, weaned[4]	77.8	83.3	55.6	100.0		
Av. weaning age, days	221	-	235	-		
Adj. ADG[5]	1.75	-	1.66	-		
Av. type score[6]	12	-	12	-		
Av. condition score[6]						

1 - Purebreds, grade, line, backcross, three-breed cross, treatment, etc.
2 - Total number put in breeding herd
3 - Total number born, dead + alive
4 - Number weaned, divided by number of cows exposed
5 - Indicate adjustments:

$$\text{Average Daily Gain} = \frac{\text{weight - birth weight}}{\text{age in days}}$$

weight was adjusted for sex and age of dam

6 - 15, 16, and 17 = Fancy
12, 13, and 14 = Choice
9, 10, and 11 = Good
6, 7, and 8 = Medium

* Data on fall calves are incomplete - data presented are through the fourth month.
** First-calf heifers

FORM II
POSTWEANING PERFORMANCE OF CALVES FED IN 1962

				Arkansas		State
	(fall)	(summer)	(fall)	(summer)	(fall)	(summer)
Location	Main Sta.	Main Sta.	Main Sta.	Main Sta.	Co-op	Co-op
Breed of sire	Angus	Angus	Hereford	Hereford	Hereford	Angus
Breed of dam	Angus	Angus	Hereford	Hereford	Hereford	Angus
Line or group*	Purebred	Purebred	Purebred	Purebred	Purebred	Purebred
Bulls						
No. in group	28	28	16	17	3	3
Feed regime**						
Av. init. age	245	236	225	224	-	300
Av. init. wt.	456	469	422	397	449	418
Av.no.da.fed	154	154	154	154	154	154
Av. final wt.	805	759	792	727	809	669
ADG on test	2.27	1.86	2.43	2.14	2.34	1.63
Av. type sc.	66	70	66	71	68	71
Av. cond. sc.	68	67	70	69	68	69
Av. inbreeding	0.0499	0.0898	0.0330	0.0534	-	-
Heifers						
No. in group	12	14	24	6		
Feed regime**						
Av. init. age	215	207	209	211		
Av. init. wt.	392	387	364	351		
Av.no.da.fed	153	153	153	153		
Av. final wt.	521	485	470	435		
ADG on test	0.84	0.64	0.69	0.55		
Av. type sc.	69	68	64	66		
Av. cond. sc.	67	65	64	64		
Av. inbreeding	0.0852	0.0333	0.0332	0.0326		
Steers						
No. in group						
Feed regime**						
Av. init. age						
Av. init. wt.						
Av.no.da.fed						
Av. final wt.						
ADG on test						
Av. type sc.						
Av. cond. sc.						
Av. inbreeding						

*Show whether station-owned or cooperator-owned, in addition to other group designation.

**Feed regime:	BULLS	HEIFERS	STEERS
How fed - full, limited, etc.	Full-fed hay; grain adj. daily to 2:1 ratio	Group fed on pasture, 3-4 lbs. grain/day	
Pounds/day over feeding period			
Ration:	Crimped corn - 800 lbs. Crimped oats - 400 lbs. CSM - 400 lbs. Wheat bran - 200 lbs. Molasses - 100 lbs. Alfalfa - 100 lbs. Calcium carb. - 20 lbs.	Crimped corn - 800 lbs. Crimped oats - 400 lbs. CSM - 400 lbs. Wheat bran - 200 lbs. Molasses - 100 lbs. Alfalfa - 100 lbs. Calcium carb. - 20 lbs.	

FORM II
POSTWEANING PERFORMANCE OF CALVES FED IN 1962

Arkansas State

Location	Main Sta.	Main Sta.	L-F Sta.	L-F Sta.		
Breed of sire	Shorthorn	Shorthorn	Angus	Angus		
Breed of dam	Shorthorn	Shorthorn	Angus	Angus		
Line or group*	Purebred	Purebred	Purebred	Purebred		
Bulls: No. in group	2					
Feed regime**						
Av. init. age	235					
Av. init. wt.	430					
Av.no.da.fed	154					
Av. final wt.	754					
ADG on test	2.10					
Av. type sc.	69					
Av. cond. sc.	68					
Av. inbreeding	0.1014					
Heifers: No. in group	2	4	6	13		
Feed regime**						
Av. init. age	218	228	218	213		
Av. init wt.	388	390	403	380		
Av.no.da.fed	153	153	150	153		
Av. final wt.	468	516	536	453		
ADG on test	0.52	0.82	0.89	0.48		
Av. type sc.	64	69	67	66		
Av. cond. sc.	64	66	68	66		
Av. inbreeding	0.0957	0.0987	0.0221	0.0517		
Steers: No. in group						
Feed regime**						
Av. init. age						
Av. init. wt.						
Av.no.da.fed						
Av. final wt.						
ADG on test						
Av. type sc.						
Av. cond. sc.						
Av. inbreeding						

* Show whether station-owned or cooperator-owned, in addition to other group designation.

** Feed regime:

	BULLS	HEIFERS	STEERS
How fed - full, limited, etc.			
Pounds/day over feeding period			
Ration:			

FORM III
SLAUGHTER DATA, 1962

	Arkansas				State	
	(spring)	(fall)	(spring)	(fall)	(spring)	(fall)
Location	Main Sta.	Main Sta.	Main Sta.	Main Sta.	Main Sta.	Main Sta.
Breed of sire	Hereford	Hereford	Angus	Angus	Shorthorn	Shorthorn
Breed of dam	Hereford	Hereford	Angus	Angus	Shorthorn	Shorthorn
Line or group	Purebred	Purebred	Purebred	Purebred	Purebred	Purebred
Sex	Bull	Bull	Bull	Bull	Bull	
Age at slaughter	389	391	419	421	415	
No. slaughtered	5	7	18	17	2	
Days in feedlot	154	154	154	154	154	
Final feedlot wt.	674	742	732	792	754	
Slaughter wt., live	694	766	741	806	783	
Carcass wt., cold	378	405	412	445	431	
Dressing percent, cold	0.56	0.53	0.56	0.55	0.55	
Carcass grade, quality	11	10	10	12	12	
Carcass grade, cutability						
Est. percent kidney fat	4.8	5.7	5.4	7.4	6.8	
Rib-eye area/100 lbs. carcass	8.59	8.56	9.24	9.45	8.83	
Marbling score						
Fat thickness over rib eye*	0.26	0.23	0.21	0.27	0.29	
W-B shear force, pounds**						

* Use one measure - if not, indicate method.

** Indicate size of core used and how meat was cooked.

UNIVERSITY OF FLORIDA
Agricultural Experiment Station

I. PROJECT: Hatch 1136, AH Line Project d1-34 (S-10)

Biochemical and Cytological Investigations of Inherited Dwarfism in Beef Cattle

II. OBJECTIVES:

To determine: (1) biochemical abnormalities in body fluids and tissues which may serve to identify carriers of the dwarf trait, and (2) the cytogenic characteristics of dwarf, carrier, and non-carrier cattle.

III. PERSONNEL:

J. R. Crockett, M. Koger, J. P. Feaster, and A. C. Warnick

IV. ACCOMPLISHMENTS DURING THE YEAR:

This project replaced Project No. 752, effective February 4, 1963. Most of the work this year has revolved around closing out the work on matings between different forms of dwarfism and work in cooperation with the Medical School on mucopolysaccharidosis in the dwarf. The major contribution of the past year's work is an increase in the number of test matings between snorter dwarf bulls and cows of mixed (Brahman-native) breeding known to carry the dwarf gene. The ratio of dwarf to normal calves from these matings continues to be significantly lower than the 1:1 ratio expected, and substantiates the conclusion that genes carried by the animals of mixed breeding modify the expression of the snorter dwarf gene. Not only are dwarfs less frequent than expected, but lethability of the gene in phenotypic dwarfs is reduced also.

V. FUTURE PLANS:

The biochemical and cytological investigations called for in the new project outline will be expanded. Efforts to secure financial support will be continued.

VI. PUBLICATIONS:

None

VII. PUBLICATIONS PLANNED:

Distorted Ratios from Mating Dwarf Bulls to Carrier Females of Mixed Breeding.

Submitted by: Marvin Koger

WEST CENTRAL FLORIDA EXPERIMENT STATION
Brooksville, Florida

I. PROJECT: State Project No. 629, AH Line Project d1-5 (S-10)

Selection of Cattle for Beef Production in the Southeastern United States

II. OBJECTIVES:

To improve the reproductive efficiency and meat producing qualities of different strains of cattle under Florida conditions, to test various breeding systems with these cattle, and to determine if combining ability can be increased with cross-progeny testing.

III. PERSONNEL:

Marvin Koger, W. C. Burns, R. S. Temple, A. C. Warnick, A. Z. Palmer, and W. G. Kirk

IV. ACCOMPLISHMENTS DURING THE YEAR:

1. Scope and nature of the work

All the cross fences at the Turnley area were completed. A three-bedroom house is also being built at that area. When this house is finished, the area will be a complete unit.

One-half of the Hereford cattle were shipped to Miles City, Montana, as a part of the genetic-environmental interaction study.

A molasses storage tank of approximately 75 tons capacity was installed at the station.

2. Research results

Four years of data on creep feeding have shown that it does not pay either for the weaning calf or for the yearlings.

A commercial pellet with multiple sources of protein was found to be better than a straight 41 percent cottonseed pellet on a wintering study of mature cows. This is in opposition to last year's results.

A study of summering programs for mature cows was made using a control group, a hay-fed group, and a protein-fed group. The protein group was found to do best, followed by the hay group and the control group.

All groups of cattle except the Santa Gertrudis had a pregnancy rate of 85 percent or better. Pregnancy rate for the Santa Gertrudis was 55 percent. The Santa Gertrudis cattle continue to wean the heaviest calves, however. They are followed by the Brahman, Hereford, and Angus, respectively.

V. FUTURE PLANS:

There will be a continued expansion of cattle numbers to meet the requirements of the project outline and to properly stock the pastures. Different methods for growing out bulls will be evaluated. The work on the value of Vitamin A to steers on pasture will be continued.

VI. PUBLICATIONS:

None

VII. PUBLICATIONS PLANNED:

Performance of five breeds of beef cattle

Response of different breed groups to creep feeding

Performance of mature cows on two sources of protein in a winter program

The comparison of protein, hay, and a control group in a summer program on the performance of mature cows.

Submitted by: W. C. Burns

I. PROJECT: AH Line Project d1-41 (S-10)

A Study of Response to Selection and Genetic-Environmental Interaction in Genetically Similar Groups of Hereford Cattle at Two Locations

II. OBJECTIVES:

To determine whether originally genetically similar groups of cattle, bred and selected for several generations according to the same criteria, in the two markedly different environmental conditions of Miles City, Montana, and Brooksville, Florida, become genetically different or remain similar.

To establish the importance of genetic-environmental interaction within a British breed of beef cattle.

To determine the importance of adaptation to a specific location if maximum productivity is to be attained.

III. PERSONNEL:

E. J. Warwick, N. M. Kieffer, W. C. Burns, R. T. Clark, J. S. Brinks, R. S. Temple, Marvin Koger, and F. S. Willson

IV. ACCOMPLISHMENTS DURING THE YEAR:

The second calf crop from the Montana cattle will be weaned in August. One more shipment of heifer calves from Montana will complete the transfer of cattle except for the bulls.

V. FUTURE PLANS:

The project will continue as outlined.

VI. PUBLICATIONS:

None

VII. PUBLICATIONS PLANNED:

None

Submitted by: W. C. Burns

FORM I
COW PRODUCTION, 1962 CALF CROP

Florida, Brooksville State

Location	Brksvl.	Brksvl.	Brksvl.	Brksvl.		
Breed of sire	Angus	Brahman	Hereford	S. Gert.		
Breed of dam	Angus	Brahman	Hereford	S. Gert.		
Line or group[1]	Purebred	Purebred	Purebred	Purebred		
No. cows exposed[2]	89	31	72	54		
No. calves born[3]	75	27	67	44		
Calving percent, born	84	87	93	83		
Av. birth date	1/19/62	2/03/62	1/20/62	1/26/62		
Av. birth wt.	60	60	69	75		
No. calves weaned	53	19	52	33		
Calving percent, weaned[4]	80	78	85	81		
Av. weaning age, days	221	206	220	214		
Adj. ADG[5]	1.69	1.86	1.74	2.17		
Av. type sc.[6]	11.8	10.2	11.6	10.9		
Av. condition score[6]	9.4	8.3	9.5	9.4		

1 - Purebreds, grade, line, backcross, three-breed cross, treatment, etc.
2 - Total number put in breeding herd
3 - Total number born, dead + alive
4 - Number weaned, divided by number of cows exposed
5 - Indicate adjustments:

Sex Factors:

Bull	0.96
Steer	1.00
Heifer	1.08

Dam Factors:

Age 01	1.23
02	1.16
03	1.10
04	1.05
05	1.03
06-10	1.00
11	1.05

6 - 15, 16, and 17 = Fancy
12, 13, and 14 = Choice
9, 10, and 11 = Good
6, 7, and 8 = Medium

FORM II
POSTWEANING PERFORMANCE OF CALVES FED IN 1962

Florida, Brooksville State

Location	Brksvl.	Brksvl.	Brksvl.	Brksvl.		
Breed of sire	Angus	Brahman	Hereford	S. Gert.		
Breed of dam	Angus	Brahman	Hereford	S. Gert.		
Line or group[1]	Co-op	Co-op	Co-op	Co-op		
Bulls: No. in group	9 (11-2)*	4 (10-6)*	9 (12-3)*	6 (10-4)*		
Bulls: Feed regime[2]						
Bulls: Av. init. age	226	209	230	209		
Bulls: Av. init. wt.	475	477	457	564		
Bulls: Av.no.da.fed	366	366	366	366		
Bulls: Av. final wt.	942	1017	952	1177		
Bulls: ADG on test	1.27	1.47	1.35	1.67		
Bulls: Av. type sc.	9.54	9.30	8.60	9.10		
Bulls: Av. cond. sc.	12.00	10.30	10.80	11.50		
Bulls: Av. inbreeding						
Heifers: No. in group	15	5	10	15		
Heifers: Feed regime[2]						
Heifers: Av. init. age	221	206	220	214		
Heifers: Av. init. wt.	416	397	430	476		
Heifers: Av.no.da.fed	366	366	366	366		
Heifers: Av. final wt.	703	754	733	832		
Heifers: ADG on test	0.78	0.98	0.83	0.87		
Heifers: Av. type sc.						
Heifers: Av. cond. sc.	8.5	8.0	8.5	9.0		
Heifers: Av. inbreeding						
Steers: No. in group						
Steers: Feed regime[2]						
Steers: Av. init. age						
Steers: Av. init. wt.						
Steers: Av.no.da.fed						
Steers: Av. final wt.						
Steers: ADG on test						
Steers: Av. type sc.						
Steers: Av. cond. sc.						
Steers: Av. inbreeding						

1 - Show whether station-owned or cooperator-owned, in addition to other group designation.

2 - Feed regime:

	BULLS	HEIFERS	STEERS
How fed - full, limited, etc.	Fed 2% body wt. hay free-choice, 140 days	Limited on pasture	
Pounds/day over feeding period	12 lbs./day, 140 days, + 3 lbs. hay	6 lbs./day for 188 days	
Ration:	10 lbs. hay on pasture DRY LOT: 2 lbs. CSM (41%) + Gr. sn. corn - 40% Citrus molasses - 40% Cottonseed hulls - 20% PASTURE: CSM (41%) - 2 lbs. Gr. sn. corn - 4 lbs. Citrus molasses - 4 lbs.	CSM (41%) - 2 lbs. Gr. sn. corn - 2 lbs. Citrus molasses - 2 lbs.	

*Numbers in parentheses indicate total number of bulls minus number culled after 140-day feeding test.

GEORGIA COASTAL PLAIN EXPERIMENT STATION
Tifton, Georgia

I. PROJECT: State 2-99 (S-10)

Selection of Beef Cattle for Single Items of Importance in Profitable Beef Production

II. OBJECTIVES:

To obtain preliminary information on the relative effectiveness of selecting for a single character.

To observe trends in characters for which no selection is made when selection is for a single character.

III. PERSONNEL:

W. C. McCormick, T. M. Clyburn, and B. L. Southwell

IV. ACCOMPLISHMENTS DURING THE YEAR:

Four herds of grade Polled Hereford females, owned and maintained by the Georgia State Prison Farm, Reidsville, are used to study selecting for (1) weaning weight, (2) rate of post-weaning gain, (3) weaning score, and (4) average performance. For the latter group, replacements are selected whose records are nearest average for each trait. Bulls used are selected from the Polled Hereford herd at Tifton.

TABLE 1. Weaning Data, 1962 Calf Crop

Herd	No. calves weaned	Av. birth weight	ADG, birth to weaning	Weaning Scores	
				Type	Cond.
Weaning-weight	46	78	1.58	10.9	10.1
Rate-of-gain	42	74	1.43	11.1	9.9
Score	25	72	1.30	10.7	9.9
Average	46	72	1.31	10.6	9.4

Rate of gain during the post-weaning wintering period (approximately October 15 to April 1) for heifer calves was 0.37, 0.52, 0.48, and 0.62, respectively, for the herds as listed above.

From the 1961 steer calf crop, animals were selected to obtain growth and carcass data. The steers were grazed from December 7 to the following October on small grain and millet pastures. During the latter three weeks the steers were also fed ground snapped corn and cottonseed meal.

TABLE 2. Average Performance by Herds

Herd	Pre-wean	Post-wean	Final wt., lbs.	Final age, days	Wt./day age	Sl. grade	Carcass Wt.	Carcass Length	Sq.in. REA/cwt. carcass	Car-cass grade	Car. wt./day age
Wean-wt.	1.71	1.81	998	616	1.62	10.5	576	47.7	1.56	9.8	.93
Rate-of-gain	1.75	1.85	1012	614	1.65	10.4	591	47.7	1.65	9.9	.96
Score	1.62	1.77	908	593	1.53	9.9	520	46.5	1.61	9.6	.88
Average	1.51	1.82	949	618	1.54	10.5	533	45.9	1.66	9.3	.86

V. FUTURE PLANS:

The project will be continued as outlined.

VI. PUBLICATIONS:

Routine annual reports

VII. PUBLICATIONS PLANNED:

An analysis of the data will be made as soon as Generation-1 data are complete.

Submitted by: W. C. McCormick

I. PROJECT: Animal Husbandry 209, AH Line Project d1-3 (S-10)

A Study of Grading, Crisscrossing, and Rotational Crossing as Breeding Systems for Commercial Beef Production

II. OBJECTIVES:

To study the relative value of grading, crisscrossing, and rotational crossing as breeding systems for commercial beef production.

To study heterotic effects in crosses between Angus and Polled Hereford breeds as compared to heterosis in crosses between these breeds and Santa Gertrudis, a breed based partially in a Brahman foundation.

To study the comparative value of the Santa Gertrudis breed with the Angus and Polled Hereford breeds.

III. PERSONNEL:

W. C. McCormick, T. M. Clyburn, R. L. Saffle, and B. L. Southwell

IV. ACCOMPLISHMENTS DURING THE YEAR:

TABLE 1. Weaning Data, 1962 Calf Crop, Calves Raised by Foundation Cows

Herd	Breeding System	No. Calves	Av. Birth Wt.	ADG, birth to weaning	Av. type score	Av. cond. score
Gr. A	Grading up	28	65	1.34	10.9	9.5
Gr. PH	Grading up	29	74	1.44	10.1	8.9
Gr. SG	Grading up	26	74	1.73	8.6	8.9
A x PH	Crisscrossing	26	66	1.44	10.2	9.9
A x SG	Crisscrossing	24	68	1.44	9.3	8.7
PH x SG	Crisscrossing	24	72	1.74	9.4	9.4
A x PH x SG	Rotational crossing	40	72	1.64	10.0	10.1

Foundation cows are being replaced with Generation-One animals as rapidly as possible.

TABLE 2. Weaning Data, 1962 Calf Crop Raised by Generation-One Animals

Herd	Breeding System	No. Calves	Av. Birth Wt.	ADG, birth to weaning	Av. type score	Av. cond. score
Gr. A	Grading up	7	61	1.23	10.1	8.7
Gr. PH	Grading up	9	71	1.24	9.5	8.2
Gr. SG	Grading up	6	69	1.70	8.5	9.4
A x PH	Crisscrossing	8	65	1.34	9.8	8.8
A x SG	Crisscrossing	10	65	1.43	8.8	8.3
PH x SG	Crisscrossing	10	66	1.45	8.9	8.9
A x PH x SG	Rotational crossing	11	70	1.60	9.7	9.6

The third and final group of generation-one steers were grown out to obtain growth and carcass data for the various breeding groups. These steers were born during the spring of 1961. They were pastured, beginning January 4, 1962, on small grain and millet pastures, for a period of 235 days. Eight steers were selected from each of the grade and criss-cross groups while 12 were selected from the rotational group. A proportionate number of steers were selected from each sire and breed group within a herd.

TABLE 3. Growth and Carcass Data

Herd	ADG, lbs. Pre-wean	ADG, lbs. Post-wean	Final wt., lbs.	Final age, days	Wt./day age	Sl. grade	Carcass Wt.	Carcass Length	Sq.in. REA/cwt. carcass	Car. grade	Carcass wt./da. age
Gr. A	1.67	1.61	823	558	1.48	8.9	471	45.8	1.66	8.9	.84
Gr. PH	1.56	1.86	859	566	1.52	8.7	484	46.5	1.79	7.9	.89
Gr. SG	1.79	1.89	931	569	1.63	8.6	531	47.6	1.62	8.1	.93
AxH	1.69	1.78	883	574	1.54	9.6	503	46.5	1.61	8.8	.88
AxSG	1.74	1.60	890	572	1.56	9.3	518	46.9	1.60	8.9	.91
HxSG	1.79	1.80	917	556	1.64	9.3	538	47.3	1.71	8.3	1.04
AxHxSG	1.79	1.83	914	559	1.63	9.1	528	47.1	1.68	8.5	.98

V. FUTURE PLANS:

Studies will be continued as planned.

VI. PUBLICATIONS:

Routine annual reports

VII. PUBLICATIONS PLANNED:

The first six years of weaning data for generation-one animals have been analyzed and are being written for publication. Three years of data on growth and carcass studies have also been analyzed and will be published.

Submitted by: W. C. McCormick

I. PROJECT: Animal Husbandry 224, AH Line Project d1-3 (S-10)

Improvement of Performance and Carcass Quality in Beef Cattle Through Selection

II. OBJECTIVES:

To develop herds of Polled Hereford and Angus cattle with superior performance.

To progeny test Polled Hereford and Angus sires with selection criteria based primarily on pre-weaning and post-weaning growth rate, carcass meatiness, and tenderness.

III. PERSONNEL:

W. C. McCormick, D. W. Beardsley, R. L. Saffle, and B. L. Southwell

IV. ACCOMPLISHMENTS DURING THE YEAR:

The Polled Hereford herd of around 110 females was mated to six sires. Sires 887, F74, and 747 were bred to cows designated as superior and to tester cows. Performance tested bulls - 81, 47, and 111B - were mated to tester cows. The Angus herd was bred artificially to 99, a University of Georgia bull, and naturally to 368, a performance-tested bull selected from the station herd.

The calves were born from January to March. The Angus calves and Polled Hereford calves were creep-fed. All calves were weaned September 11, 1962, and the bulls were placed on feed immediately for 168 days. The Angus bulls and Polled Hereford bulls sired by 47 and 111B were fed in sire groups. At weaning, prospective breeding heifers were separated and placed on pasture. Restricted grain feeding was practiced until the small grain pasture was ready to graze. Thereafter, grain feeding was discontinued. At the end of the feeding period, calves sired by 47 and 111B were slaughtered to obtain carcass data.

TABLE 1. Growth and Feedlot Data

Breed	Sire	No. bull calves	Wean weight	Feedlot daily gain	Final age	Wt./day of age	Type score
PH	887	6	515	3.10	396	2.61	11.1
PH	F74	7	483	3.16	392	2.58	11.5
PH	747	5	437	2.88	413	2.23	11.0
PH	81	2	390	2.85	396	2.19	11.8
PH	47	6	514	3.11	396	2.62	11.3
PH	111B	4	462	3.04	394	2.48	11.5
A	368	11	414	2.54	372	2.26	11.0
A	99	10	455	2.69	401	2.26	11.6

TABLE 2. Carcass Data

Breed	Sire	No. killed	Dressing percent	Av. rib-eye fat thickness	Av. REA per cwt. carcass	Carcass wt./day of age	Carcass length
PH	47	8	58.2	.49	2.23	1.30	44.9
PH	111B	10	58.9	.51	2.20	1.22	42.1

Feed efficiency for bull calves sired by 47 and 111B was 7.6 and 7.7 pounds, respectively, per pound of gain. Both sires were retained for future breeding.

V. FUTURE PLANS:

The project will be continued as outlined.

VI. PUBLICATIONS:

Routine annual reports

VII. PUBLICATIONS PLANNED:

None

Submitted by: W. C. McCormick

FORM I
COW PRODUCTION, 1962 CALF CROP

Georgia State

Location	Tifton	Tifton	Reidsville	Reidsville	Reidsville	Reidsville
Breed of sire	Angus	P.Hereford	P.Hereford	P.Hereford	P.Hereford	P.Hereford
Breed of dam	Angus	P.Hereford	Gr. PH	Gr. PH	Gr. PH	Gr. PH
Line or group[1]	Purebred	Purebred	Wean-Wt.	Rate-Gain	Score	Average
No. cows exposed[2]	47	113	51	47	46	51
No. calves born[3]	32	87	47	42	25	46
Calving percent, born	68	77	92	89	54	90
Av. birth date	2/07/62	1/25/62	2/09/62	1/29/62	1/25/62	2/02/62
Av. birth wt.	64	71	78	74	72	72
No. calves weaned	29	82	46	42	25	46
Calving percent, weaned[4]	62	73	90	89	54	90
Av. weaning age, days	216	229	241	252	256	248
Adj. ADG[5]	1.65	1.62	1.58	1.43	1.30	1.31
Av. type sc.[6]	11.1	10.8	10.9	11.1	10.7	10.6
Av. cond. sc.[6]	9.4	9.9	10.1	9.9	9.9	9.4

1 - Purebreds, grade, line, backcross, three-breed cross, treatment, etc.
2 - Total number put in breeding herd
3 - Total number born, dead + alive
4 - Number weaned, divided by number of cows exposed
5 - Indicate adjustments:

NONE

6 - 15, 16, and 17 = Fancy
12, 13, and 14 = Choice
9, 10, and 11 = Good
6, 7, and 8 = Medium

FORM I
COW PRODUCTION, 1962 CALF CROP

Georgia State

Location	Reidsville	Reidsville	Reidsville	Reidsville	Reidsville	Reidsville
Breed of sire	Angus	P. Hereford	S. Gert.	A-PH	A-SG	PH-SG
Breed of dam	Gr.Angus	Gr. PH	Gr. SG	A x PH	A x SG	PH x SG
Line or group[1]	Grade	Grade	Grade	Crisscross	Crisscross	Crisscross
No. cows exposed[2]	37	44	42	39	43	42
No. calves born[3]	35	38	32	34	34	34
Calving percent, born	95	86	76	87	79	81
Av. birth date	1/23/62	2/10/62	2/05/62	1/28/62	2/01/62	2/04/62
Av. birth wt.	64	73	73	66	68	70
No. calves weaned	34	37	32	33	30	34
Calving percent, weaned[4]	92	84	76	85	70	81
Av. weaning age, days	268	247	245	262	254	250
Adj. ADG[5]	1.32	1.39	1.72	1.42	1.44	1.65
Av. type sc.[6]	10.7	10.0	8.7	10.3	9.1	9.3
Av. cond. sc.[6]	9.3	8.8	9.1	9.4	8.7	9.3

1 - Purebreds, grade, line, backcross, three-breed cross, treatment, etc.
2 - Total number put in breeding herd
3 - Total number born, dead + alive
4 - Number weaned, divided by number of cows exposed
5 - Indicate adjustments:

NONE

6 - 15, 16, and 17 = Fancy
12, 13, and 14 = Choice
9, 10, and 11 = Good
6, 7, and 8 = Medium

FORM I
COW PRODUCTION, 1962 CALF CROP

Georgia State

Location	Reidsville					
Breed of sire	A-PH-SG					
Breed of dam	A x PH x SG					
Line or group[1]	Rotational					
No. cows exposed[2]	65					
No. calves born[3]	51					
Calving per-cent, born	79					
Av. birth date	1/28/62					
Av. birth wt.	71					
No. calves weaned	49					
Calving per-cent, weaned[4]	75					
Av. weaning age, days	258					
Adj. ADG[5]	1.63					
Av. type sc.[6]	9.9					
Av. cond. sc.[6]	10.0					

1 - Purebreds, grade, line, backcross, three-breed cross, treatment, etc.
2 - Total number put in breeding herd
3 - Total number born, dead + alive
4 - Number weaned, divided by number of cows exposed
5 - Indicate adjustments:

NONE

6 - 15, 16, and 17 = Fancy
12, 13, and 14 = Choice
9, 10, and 11 = Good
6, 7, and 8 = Medium

FORM II
POSTWEANING PERFORMANCE OF CALVES FED IN 1962

Georgia State

Location	Tifton	Tifton					
Breed of sire	P.Hereford	Angus					
Breed of dam	P.Hereford	Angus					
Line or group[1]	Purebred	Purebred					
Bulls: No. in group	39	19					
Bulls: Feed regime[2]							
Bulls: Av.init.age	212	214					
Bulls: Av. init. wt.	475	441					
Bulls: Av.no.da.fed	168	168					
Bulls: Av. final wt.	900	868					
Bulls: ADG on test	2.53	2.54					
Bulls: Av. type sc.	11.4	11.2					
Bulls: Av. cond. sc.	11.3	11.6					
Bulls: Av. inbreeding							
Heifers: No. in group							
Heifers: Feed regime[2]							
Heifers: Av. init. age							
Heifers: Av. init. wt.							
Heifers: Av.no.da.fed							
Heifers: Av. final wt.							
Heifers: ADG on test							
Heifers: Av. type sc.							
Heifers: Av. cond. sc.							
Heifers: Av. inbreeding							
Steers: No. in group							
Steers: Feed regime[2]							
Steers: Av. init. age							
Steers: Av. init. wt.							
Steers: Av.no.da.fed							
Steers: Av. final wt.							
Steers: ADG on test							
Steers: Av. type sc.							
Steers: Av. cond. sc.							
Steers: Av. inbreeding							

1 - Show whether station-owned or cooperator-owned, in addition to other group designation.

2 - Feed Regime:	Bulls	Heifers	Steers
How fed - full, limited, etc.	Full-fed		
Pounds/day over feeding period			
Ration:	900 lbs. gr. snapped corn 200 lbs. oats 150 lbs. molasses 300 lbs. cottonseed meal 450 lbs. coarse-ground C. B. hay 200 gms. stabilized Vitamin A (10,000 IU/gram)		

FORM II
POSTWEANING PERFORMANCE OF CALVES FED IN 1962

Georgia State

Location	Reidsville	Reidsville	Reidsville	Reidsville		
Breed of sire	P.Hereford	P.Hereford	P.Hereford	P.Hereford		
Breed of dam	Gr. PH	Gr. PH	Gr. PH	Gr. PH		
Line or group[1]	Wean wt.	Rate gain	Score	Average		
Bulls: No. in group						
Bulls: Feed regime[2]						
Bulls: Av. init. age						
Bulls: Av. init. wt.						
Bulls: Av.no.da.fed						
Bulls: Av. final wt.						
Bulls: ADG on test						
Bulls: Av. type sc.						
Bulls: Av. cond. sc.						
Bulls: Av. inbreeding						
Heifers: No. in group						
Heifers: Feed regime[2]						
Heifers: Av. init. age						
Heifers: Av. init. wt.						
Heifers: Av.no.da.fed						
Heifers: Av. final wt.						
Heifers: ADG on test						
Heifers: Av. type sc.						
Heifers: Av. cond. sc.						
Heifers: Av. inbreeding						
Steers: No. in group	12	11	11	12		
Steers: Feed regime[2]						
Steers: Av. init. age	303	301	280	305		
Steers: Av. init. wt.	438	442	376	388		
Steers: Av.no.da.fed	313	313	313	313		
Steers: Av. final wt.	998	1012	908	949		
Steers: ADG on test	1.81	1.85	1.77	1.82		
Steers: Av. type sc.						
Steers: Av. cond. sc.	10.5	10.4	9.9	10.5		
Steers: Av. inbreeding						

1 - Show whether station-owned or cooperator-owned, in addition to other group designation.

2 - Feed regime:	Bulls	Heifers	Steers
How fed - full, limited, etc			Grazed
Pounds/day over feeding period			
Ration:			Grazed on small grain a millet pastures. Fed snapped corn and cotton seed meal mixture approximately last thre weeks of test period.

FORM II
POSTWEANING PERFORMANCE OF CALVES FED IN 1962

Georgia State

	Location	Reidsville	Reidsville	Reidsville	Reidsville	Reidsville	Reidsville
	Breed of sire	Angus	P.Hereford	S. Gert.	A-PH	A-SG	PH-SG
	Breed of dam	Gr. Angus	Gr. PH	Gr. SG	A x PH	A x SG	PH x SG
	Line or group1	Grade	Grade	Grade	Crisscross	Crisscross	Crisscross
Bulls	No. in group						
	Feed regime2						
	Av. init. age						
	Av. init. wt.						
	Av.no.da.fed						
	Av. final wt.						
	ADG on test						
	Av. type sc.						
	Av. cond. sc.						
	Av. inbreeding						
Heifers	No. in group						
	Feed regime2						
	Av. init. age						
	Av. init. wt.						
	Av.no.da.fed						
	Av. final wt.						
	ADG on test						
	Av. type sc.						
	Av. cond. sc.						
	Av. inbreeding						
Steers	No. in group	8	8	8	8	8	8
	Feed regime2						
	Av. init. age	323	331	334	339	337	321
	Av. init. wt.	439	421	489	463	510	494
	Av.no.da.fed	235	235	235	235	235	235
	Av. final wt.	823	859	931	883	890	917
	ADG on test	1.61	1.86	1.89	1.78	1.60	1.80
	Av. type sc.						
	Av. cond. sc.	8.9	8.7	8.6	9.6	9.3	9.3
	Av. inbreeding						

1 - Show whether station-owned or cooperator-owned, in addition to other group designation.

2 - Feed regime:	Bulls	Heifers	Steers
How fed - full, limited, etc.			
Pounds/day over feeding period			
Ration:			Grazed on small grain and millet pastures.

FORM II
POSTWEANING PERFORMANCE OF CALVES FED IN 1962

Georgia State

Location		Reidsville					
Breed of sire		A-PH-SG					
Breed of dam		A x PH x SG					
Line or group[1]		Rotational					
Bulls	No. in group						
	Feed regime[2]						
	Av. init. age						
	Av. init. wt.						
	Av.no.da.fed						
	Av. final wt.						
	ADG on test						
	Av. type sc.						
	Av. cond. sc.						
	Av. inbreeding						
Heifers	No. in group						
	Feed regime[2]						
	Av. init. age						
	Av. init. wt.						
	Av.no.da.fed						
	Av. final wt.						
	ADG on test						
	Av. type sc.						
	Av. cond. sc.						
	Av. inbreeding						
Steers	No. in group	12					
	Feed regime[2]						
	Av. init. age	324					
	Av. init. wt.	485					
	Av.no.da.fed	235					
	Av. final wt.	914					
	ADG on test	1.83					
	Av. type sc.						
	Av. cond. sc.	9.1					
	Av. inbreeding						

1 - Show whether station-owned or cooperator-owned, in addition to other group designation

2 - Feed regime:	Bulls	Heifers	Steers
How fed - full, limited, etc.			
Pounds/day over feeding period			
Ration:			Grazed on small grain and millet pastures.

FORM III
SLAUGHTER DATA, 1962

Georgia State

Location	Tifton	Tifton	Tifton	Tifton	Reidsville	Reidsville
Breed of sire	P.Hereford	P.Hereford	P.Hereford	P.Hereford	P.Hereford	P.Hereford
Breed of dam	P.Hereford	P.Hereford	P.Hereford	P.Hereford	Gr. PH	Gr. PH
Line or group	Sire 887	Sire 887	Sire F18	Sire F18	Wean Wt.	Rate-Gain
Sex	Male	Female	Male	Female	Male	Male
Age at slaughter	370	368	386	392	616	614
No. slaughtered	5	6	4	5	12	11
Days in feedlot	168	168	168	168	313	313
Final feedlot wt.	828	646	876	675	998	1012
Slaughter wt., live	828	646	876	675	998	1012
Carcass wt., cold	455	347	497	366	576	591
Dressing percent, cold	55.9	54.5	57.8	55.1	57.7	58.3
Carcass grade, quality	6.0	7.2	7.8	7.2	9.8	9.9
Carcass grade, cutability						
Est. percent kidney fat						
Rib-eye area/100 lbs. carcass	2.26	2.29	2.31	2.30	1.56	1.65
Marbling score						
Fat thickness over rib eye[1]	0.44	0.41	0.34	0.37	0.59	0.69
W-B shear force, pounds[2]					11.3	9.3

1 - Use one measure; if not, indicate method.

Average of three measurements

2 - Indicate size of core used and how meat was cooked.

One-half inch

FORM III
SLAUGHTER DATA, 1962

Georgia State

Location	Reidsville	Reidsville	Reidsville	Reidsville	Reidsville	Reidsville
Breed of sire	P.Hereford	P.Hereford	Angus	P.Hereford	S. Gert.	A-PH
Breed of dam	Gr. PH	Gr. PH	Gr. Angus	Gr. H	Gr. SG	A x H
Line or group	Score	Average	Grade	Grade	Grade	Crisscross
Sex	Male	Male	Male	Male	Male	Male
Age at slaughter	593	618	558	566	569	574
No. slaughtered	11	12	8	8	8	8
Days in feedlot	313	313	235	235	235	235
Final feedlot wt.	908	949	823	859	931	883
Slaughter wt., live	908	949	823	859	931	883
Carcass wt., cold	520	533	471	484	531	503
Dressing percent, cold	57.2	56.1	57.3	56.3	57.0	57.1
Carcass grade, quality	9.6	9.3	8.9	7.9	8.1	8.8
Carcass grade, cutability						
Est. percent kidney fat						
Rib-eye area/100 lbs. carcass	1.61	1.66	1.66	1.79	1.62	1.61
Marbling score						
Fat thickness over rib eye[1]	0.61	0.56	0.48	0.48	0.44	0.53
W-B shear force, pounds[2]	8.3	10.7	6.7	6.7	9.5	7.7

1 - Use one measure; if not, indicate method.

Average of three measurements

2 - Indicate size of core used and how meat was cooked.

one-half inch

FORM III
SLAUGHTER DATA, 1962

Georgia State

Location	Reidsville	Reidsville	Reidsville			
Breed of sire	A-SG	PH-SG	A-H-SG			
Breed of dam	A x SG	H x SG	A x H x SG			
Line or group	Crisscross	Crisscross	Rotational			
Sex	Male	Male	Male			
Age at slaughter	572	556	559			
No. slaughtered	8	8	12			
Days in feedlot	235	235	235			
Final feedlot wt.	890	917	914			
Slaughter wt., live	890	917	914			
Carcass wt., cold	518	538	528			
Dressing percent, cold	58.2	58.6	57.8			
Carcass grade, quality	8.9	8.3	8.5			
Carcass grade, cutability						
Est. percent kidney fat						
Rib-eye area/100 lbs. carcass	1.60	1.71	1.68			
Marbling score						
Fat thickness over rib eye[1]	0.54	0.55	0.51			
W-B shear force, pounds[2]	7.1	7.6	7.9			

1 - Use one measure; if not, indicate method.

Average of three measurements

2 - Indicate size of core used and how meat was cooked.

One-half inch

UNIVERSITY OF KENTUCKY
Agricultural Experiment Station

I. PROJECT: Animal Science 260 (S-10)

Measurement and Selection of Economically Important Traits in Beef Cattle

II. OBJECTIVES:

To use rate of gain, efficiency, conformation, and carcass characteristics in an over-all selection experiment.

To develop a method of estimating a bull's transmitting ability for carcass characteristics as well as rate of gain and conformation.

III. PERSONNEL:

N. W. Bradley, D. G. Steele, W. P. Garrigus, J. D. Kemp, and W. Y. Varney

IV. ACCOMPLISHMENTS DURING THE YEAR:

A two-year study of the effects of sire, breed, and sex on preweaning and postweaning performance and carcass characteristics of Hereford and Hereford x Red Poll calves has been completed. During the two-year period covered by this study, the low gaining bull, Hereford x Red Poll, sired 33 calves and the high-gaining bull, Hereford, sired 34 calves. Of this number, 30 were heifers and 34 were steers.

At the beginning of the study, Hereford and Red Poll cows were divided so that an equal number of each breed was bred to each of the two performance tested Hereford bulls. Cows were allotted to the breeding groups on the basis of their previous calves' performance in an attempt to equalize the effect of the dam during the preweaning phase. The same two sires were used the second year, but sires and cow groups were switched. The performance of the two sires during a 154-day performance test is shown in Table 1.

TABLE 1. Performance Test Data

	High-gaining bull	Low-gaining bull
ADG on 154-day test, lb.	2.94	2.22
Lb./day of age (calculated at the end of the 154-day test)	2.69	2.17
Feed/cwt. gain, lb.	563	828
Conformation score	12.8	13.3

A two-year average of the preweaning and postweaning performance of calves is presented in Table 2. The same differences in preweaning and postweaning performance existed both years and the magnitude of these differences was about the same each year.

TABLE 2. Effect of Sire, Breed, and Sex on Preweaning and Postweaning Performance of Herefords and Hereford x Red Poll Calves - Two-Year Average

	Sire		Breed		Sex	
	Low Gainer	High Gainer	Hereford	H x RP	Heifers	Steers
Preweaning:						
No. of calves	33	34	34	33	30	37
Sex of calf						
Steer	20	17	19	18	--	37
Heifer	13	17	15	15	30	--
Birth wt., lb.	71.4	73.3	69.4	75.4	69.4	74.6
Av. age, days	281	270	276	275	275	276
Weaning wt., lb.	565	572	514	625	544	587
ADG, lb.	1.75	1.85	1.60	2.00	1.74	1.85
Grade	10.9	10.6	11.0	10.4	10.6	10.9
Postweaning - 208 days:						
No. of calves	33	34	34	33	30	37
Initial wt., lb.	565	572	514	625	544	587
Final wt., lb.	975	1028	954	1051	946	1047
ADG, lb.	1.98	2.19	2.12	2.05	1.94	2.22
Feed/cwt. gain, lb.	987	960	911	1037	1003	947
Slaughter grade	11.6	11.0	11.6	11.1	11.3	11.4
Carcass grade	11.9	11.3	11.8	11.4	11.6	11.6

During the preweaning phase the following differences are worthy of notice.

1. Calves sired by the high-gaining bull gained 0.1 lb. per calf per day faster than calves sired by the low-gaining bull.

2. Crossbred calves were 6 lbs. heavier at birth than Hereford calves.

3. Crossbred calves were 111 lbs. heavier at weaning than Hereford calves.

4. Crossbred calves gained 0.4 lbs. per head per day faster than Hereford calves.

5. Steer calves were 5 lbs. heavier at birth than heifer calves.

6. Steer calves were 43 pounds heavier at weaning than heifer calves.

The following differences which occurred during the postweaning phase are also of interest:

1. The final weight of calves sired by the high-gaining bull was 53 lbs. heavier than that of calves sired by the low-gaining bull.

2. Calves sired by the high-gaining bull gained 0.21 lb. per calf per day faster than calves sired by the low-gaining bull.

3. Red Poll calves maintained 97 lbs. of the 111-pound weight advantage which they had at weaning.

4. Hereford calves used 126 lbs. less feed for each 100 lbs. of gain.

5. The final weight for steers was 101 lbs. heavier than the final weight for heifers.

6. Steers gained 0.28 lbs. per head per day faster than heifers.

7. Steers required 76 lbs. less feed for each 100 lbs. of gain than did the heifers.

A two-year summary of the effect of sire, breed, and sex on carcass characteristics is shown in Table 3. Only small differences were observed in any of the carcass traits which were measured. Calves sired by the high-gaining bull had slightly less fat over the ribs and somewhat more rib-eye area. Hereford calves were also slightly superior to crossbred calves with respect to rib-eye area per hundredweight of carcass. Physical separation of the 9-10-11th rib section showed calves sired by the high-gaining bull and steers to have less separable fat, a higher percentage of rib eye, and more lean than calves sired by the low-gaining bull and heifers, respectively. Average shear values were somewhat lower for heifers than for steers, but the taste panel detected no differences in tenderness.

TABLE 3. Effect of Sire, Breed, and Sex on Carcass Characteristics

	Sire		Breed		Sex	
	Low Gainer	High Gainer	Hereford	H x RP	Heifers	Steers
No. of calves	33	34	34	33	30	37
Sex of calves						
Steers	20	17	19	18	--	37
Heifers	13	17	15	15	30	--
Carcass grade	11.9	11.3	11.8	11.4	11.6	11.6
Carcass conformation	11.9	11.7	12.2	11.5	11.6	12.1
Dressing percent[1]	62.3	61.9	61.5	62.1	61.8	62.3
Fat thickness over rib eye, in.	0.92	0.84	0.88	0.88	0.88	0.87
Rib-eye area, sq. in.	9.68	10.92	10.00	10.59	9.72	10.78
Rib-eye area/cwt. carcass, sq. in.	1.68	1.82	1.81	1.69	1.76	1.74
Marbling score[2]	6.1	5.9	6.2	5.6	6.5	5.6
Physical separation, 9-10-11th Ribs:						
Fat, percent	43.87	40.61	41.68	42.77	44.06	40.73
Rib eye, percent	15.90	17.34	16.34	16.92	16.08	17.11
Total lean, percent	42.38	45.51	44.65	43.27	42.62	45.07
Bone, percent	13.35	13.62	13.42	13.54	13.10	13.78
Flavor score	7.87	8.03	8.01	7.89	7.92	7.98
Tenderness score	7.96	7.99	7.87	7.84	7.93	7.91
Juiciness score	7.60	7.82	7.77	7.59	7.68	7.71
W-B shear force, lbs.[3]	18.4	18.7	18.6	18.4	17.9	19.5

1 - 6 hr. shrunk wt. (3 hr. haul) and 72-hour cold wt.
2 - 5 = small, 6 = modest
3 - One-inch cores

The purebred Hereford herd which will be used in the revised project has been increased to a total of 172 head. Forty-six calves were dropped during the first three months of 1963 from 17 cows and 47 first-calf heifers. A total of 115 cows and heifers are presently being bred to calve during January, February, and March of 1964. Ten progeny from each of the first three herd sires are undergoing a postweaning performance test. Their carcasses will be evaluated upon completion of the post-weaning test. Three additional herd sires have been purchased and each has been mated to 25 cows to begin progeny testing. This herd will be increased as rapidly as possible to the carrying capacity of available pastures.

V. FUTURE PLANS:

Future plans are to proceed according to the revised project outline as rapidly as time permits.

VI. PUBLICATIONS:

Bradley, N. W., T. R. Greathouse, W. P. Garrigus, W. Y. Varney, and Hugh Mahin. 1962. Effects of sire, breed, and sex on preweaning and post-weaning performance of Hereford and Hereford x Red Poll calves. Animal Science Research Reports.

Varney, W. Y., J. D. Kemp, and N. W. Bradley. 1962. Effects of sire, breed, and sex on carcass characteristics of beef cattle. Animal Science Reports.

VII. PUBLICATIONS PLANNED:

Results will be published annually in the Kentucky Livestock Field Day Report and elsewhere as justified.

Submitted by: N. W. Bradley

FORM II
POSTWEANING PERFORMANCE OF CALVES FED IN 1962

Kentucky State

	Location	Princeton	Princeton	Princeton	Princeton	Coldstream	Coldstream
	Breed of sire	Hereford	P.Hereford	Angus	Shorthorn	Hereford-X	Hereford
	Breed of dam	Hereford	P.Hereford	Angus	Shorthorn	Red Poll	Hereford
	Line or group[1]	Co-op	Co-op	Co-op	Co-op	Station	Station
Bulls	No. in group	22	9	16	10		
	Feed regime[2]						
	Av. init. age	266	240	259	271		
	Av. init. wt.	594	559	575	612		
	Av.no.da.fed	140	140	140	140		
	Av. final wt.	963	960	908	970		
	ADG on test	2.63	2.87	2.48	2.56		
	Av. type sc.	12.2	12.3	11.9	12.2		
	Av. cond. sc.						
	Av. inbreeding						
Heifers	No. in group					6	5
	Feed regime[2]						
	Av. init. age					273	293
	Av. init. wt.					637	489
	Av.no.da.fed					208	208
	Av. final wt.					1023	881
	ADG on test					1.86	1.88
	Av. type sc.					10.8	11.9
	Av. cond. sc.						
	Av. inbreeding						
Steers	No. in group					10	12
	Feed regime[2]						
	Av. init. age					291	282
	Av. init. wt.					662	567
	Av.no.da.fed					208	208
	Av. final wt.					1102	1023
	ADG on test					2.11	2.22
	Av. type sc.					11.05	11.8
	Av. cond. sc.						
	Av. inbreeding						

1 - Show whether station-owned or cooperator-owned, in addition to other group designation.

2 - Feed regime:	BULLS	HEIFERS	STEERS
How fed - full, limited, etc.	Self-fed	Self-fed	Self-fed
Pounds/day over feeding period		19.8 lbs.	21.7 lbs.
Ration:	Gr. sh. corn - 850 lbs. Gr. corn cobs - 650 lbs. Molasses - 200 lbs. Alfalfa leaf meal-50 lb. Soybean meal (44%) - 235 lbs. Dical. - 5 lbs. Trace mineral - 10 lb. Vit. A - 1M I.U.	Sh. corn - 1125 lbs. Gr. corn cobs - 400 lbs. Molasses - 180 lbs. Alfalfa leaf meal-60 lb. Soybean oil meal - 235 lbs. Dical. - 5 lbs. Trace minerals - 10 lb. Stilbosol - 1 lb. Plain salt, free choice	Sh. corn - 1125 lbs. Gr. corn cobs - 400 lbs. Molasses - 180 lbs. Alfalfa leaf meal-60 lb. Soybean oil meal - 235 lb Dical. - 5 lbs. Trace minerals - 10 lb. Stilbosol - 1 lb. Plain salt, free choice

FORM III
SLAUGHTER DATA, 1962

Kentucky State

Location	Coldstream	Coldstream	Coldstream			
Breed of sire	Hereford	Hereford	Hereford			
Breed of dam	Hereford	Red Poll	Hereford			
Line or group						
Sex	Steers	10 steers 6 heifers	12 steers 5 heifers			
Age at slaughter	632	492	493			
No. slaughtered	11	16	17			
Days in feedlot	246	208	208			
Final feedlot wt.	1030	1073	982			
Slaughter wt., live	971	1026	941			
Carcass wt., cold	604	649	588			
Dressing percent, cold	62.03	63.3	62.4			
Carcass grade, quality	12.2	11.0	11.3			
Carcass grade, cutability	3					
Est. percent, kidney fat	2.8					
Rib-eye area/100 lbs. carcass	1.81	1.68	1.73			
Marbling score	6.7	5.0	5.5			
Fat thickness over rib eye[1]	0.85	0.97	0.96			
W-B shear force, pounds[2]	17.7	19.1	20.5			

1 - Use one measure, if not, indicate method.

2 - Indicate size of core used and how meat was cooked.

1" cores, roasted at 325° to an internal temperature of 160° in electric oven. Six-hour shrunk weight (3-hour haul) and 72-hour cold weight. Federal grader.

LOUISIANA STATE UNIVERSITY
Agricultural Experiment Station

I. PROJECT: 605 (S-10)

Comparison of Various Crossbred Cattle Under Gulf Coast Conditions with Respect to Rate of Growth on Pasture, Fattening Ability, and Meat Quality of Steers

II. OBJECTIVES:

To study types and breeds of beef cattle to determine which are best suited to Gulf Coast conditions, with respect to rate of growth, fattening ability, and meat quality.

To study various crossbreeding programs as to practicality, production, and usefulness.

To study the amount of hybrid vigor obtained through crossing beef breeds and to ascertain how much of this hybrid vigor is maintained through subsequent backcrossing, multiple-breed crossing, and rotational crossing.

To study the productive ability of dams of various breeds and breed crosses.

To estimate genetic parameters.

To study practical problems of management and marketing of crossbred cattle in the Gulf Coast area.

III. PERSONNEL:

Noah England, A. M. Mullins, R. F. Bouleware, G. L. Robertson, S. E. McCraine, C. C. Phillips, Dorothy Wilson, Kenneth Koonce, J. J. Sullivan, and C. L. Seger.

IV. ACCOMPLISHMENTS DURING THE YEAR:

1. Scope and nature of the work

The beef cattle crossbreeding has been continued, and data have been collected on the various aspects of this project. The steer feeding lot has been enlarged so that all steers are now fed by sire groups, and are penned entirely on concrete for the entire feeding period. Feed efficiency can be calculated by breed of sire under this arrangement. Plans are underway to further subdivide the lot during the summer of 1963 so that steers may be fed by system of mating within sire groups.

2. Research results

Mean calf performance is given by system of mating and breed of sire in Tables 1 and 2, respectively.

TABLE 1. Summary of Calf Performance by System of Mating

Group	No. of Calves	205-day Wt. Adj. Sex Calf Age Dam	Feeder Grade	Rate of Gain on Feed	Carcass Grade
Straightbreds	64	390	9.4	1.71 (16)*	Good+
Single crosses	105	417	9.9	1.96 (18)*	Good+
Backcrosses	122	456	10.0	1.90 (37)*	Good+
Three-breed crosses	124	457	10.2	2.04 (25)*	Choice-

* Number of calves on feed.

TABLE 2. Summary of Performance by Breed of Sire

Sire	No. of Calves	205-day Wt. Adj. Sex Calf Age Dam	Feeder Grade	Rate of Gain on Feed	Carcass Grade
Angus	76	408	10.3	1.87	Choice
Brahman	67	436	9.1	1.55	Good-
Brangus	70	440	9.8	1.92	Choice-
Charolais	60	476	9.0	2.13	Good+
Hereford	52	430	11.1	1.95	Choice-
Shorthorn	61	431	10.8	1.78	Choice-

The preweaning averages are based on two years' data, while the postweaning averages are calculated from only one year's data. The 1962 steers presently on feed have had a considerably more rapid rate of gain than did the 1961 steers. It is possible that getting the steers on concrete and out of the mud has been the primary factor in this increased gain.

The third year's data on age at puberty in purebred and crossbred heifers were collected. The straightbred Angus heifers reached puberty earlier than the other straightbreds and were followed in order by Hereford, Brangus, and Brahman heifers. There were no purebred Charolais or Shorthorn heifers in the experiment. In the backcross groups, the 3/4 Shorthorn heifers reached puberty at the earliest age, followed by 3/4 Angus, 3/4 Hereford, 3/4 Brangus, 3/4 Charolais, and 3/4 Brahman. In three-breed crosses, those heifers sired by Shorthorn bulls exhibited estrus at the youngest age, followed in order by Angus-, Charolais-, Hereford-, Brangus-, and Brahman-sired heifers. In the three years the experiment has been underway there have been 24 heifers with Brahman breeding that have not shown estrus by 22 months of age, while there have been only four non-Brahmans failing to show heat by this age.

The Charolais backcross herd was used in an estrus synchronization project during the 1962 breeding season. A total of 40 Charolais-cross cows were fed two pounds of Repromix medicated feed per head per day for 18 days. The Repromix was mixed with cottonseed meal and hulls at the rate of one pound Repromix per 35 pounds of feed. All cows were run as one herd on pasture and were fed once daily in feed bunks. Twenty-seven of the 40 cows were observed in heat within three days after progesterone feeding was stopped. An additional six cows were found to be in heat during the following two days, so that a total of 33 of the 40 cows showed estrus within five days after the end of the feeding period. An average of 2.07 inseminations per conception was noted for those cows which palpated pregnant. Twenty-seven of the 40 cows conceived.

A study of factors affecting birth weight has shown that the dam exerts the major influence upon calf birth weight. Smallest calves at birth were produced by straightbred Brahman dams, followed by Angus, Brangus, and Hereford cows. In crossbred dams, those cows that contained some Brahman breeding produced the smallest calves, and as the percentage of Brahman breeding increased in the dam, calf birth weights decreased. Cows of part-Charolais breeding produced the heaviest calves at birth. Of the various breeds of sire, Angus bulls sired calves with the smallest birth weight, followed by Shorthorn-, Brangus-, Hereford-, Brahman-, and Charolais-sired calves. The fact that Brahman bulls sired calves larger than the average of all breeds, while Brahman cows produced the smallest calves at birth, indicates that the small size at birth of purebred Brahman calves is not due to a genetic condition in the calf but rather to some limitation in its prenatal environment. This study also points out that one would expect little difficulty at parturition to result from breeding small cows to large breeds of bulls, since the size of the calf at birth is primarily dependent upon the type of dam used to produce this calf.

A comparison of three mating systems (straightbred, single cross, and backcross) has revealed that backcross calves were heavier at weaning than either of the other types of calf. Single-cross calves were heavier at weaning than were the straightbred calves. Single-cross calves were significantly higher in postweaning rate of gain than either straightbreds or backcross. There was no statistically significant difference between straightbred and backcross calves in average daily gain during the postweaning period. Single-cross calves were slightly higher in carcass grade than calves of either of the other two remaining systems.

V. FUTURE PLANS:

The 605 program will be carried on with no major revision. Cows of half-Charolais breeding have been placed in all sire groups rather than in the Charolais-sire groups only. The puberty study will be continued for another year with one group being carried on winter pasture, one group on native grass pasture, and one group run on winter pasture without being exposed to vasectomized bulls. It is hoped that this latter group will enable us to determine what effect the use of vasectomized bulls has on conception rate and calving date of these heifers. The synchronization of estrus studies will also be continued during this breeding season. A number of three-breed cross heifers are being assigned to the proper breed of bull during the 1963 breeding season so that three-breed rotational-cross calves will be produced.

VI. PUBLICATIONS:

Hendry, J. E. 1963. Factors affecting birth weight in beef cattle and the relationship between birth weight and subsequent performance. Master's Thesis, Louisiana State University Library.

Koonce, Kenneth. 1963. A comparison of three systems of mating for beef cattle production. Master's Thesis, Louisiana State University Library.

Third Livestock Producers' Day Report. 1963. Animal Science Department, Louisiana State University and Agricultural Experiment Station. Pages 48-49 and 59-70.

Thrasher, D. M., Prentiss Schilling, Noah England, A. M. Mullins, and S. L. Hansard. 1963. A low-fiber, all-concentrate ration for fattening steer calves. Louisiana Agricultural Experiment Station, A.S. Mimeo. Cir. 63-3.

VII. PUBLICATIONS PLANNED:

Brown, Delos, A. M. Mullins, Noah England, and R. F. Boulware. 1963. Relationships between certain carcass characteristics of purebred and crossbred cattle. Submitted to Journal of Animal Science.

England, Noah, R. S. Temple, and B. R. Farthing. The effect of breed of dam and lactation status upon conception rate in beef cows. To be submitted to the Journal of Animal Science.

Two Master's theses are in preparation, and it is anticipated that the results of these studies will be published during 1963-1964.

Submitted by: Noah England

FORM I
COW PRODUCTION, 1962 CALF CROP

Louisiana State

Location	BatonRouge	BatonRouge	BatonRouge	BatonRouge	BatonRouge	BatonRouge
Breed of sire	Angus 333	Angus 333	Angus 660	Angus 660	Brahman 411	Brahman 411
Breed of dam	(b)	(b)	(b)	(b)	(b)	(b)
Line or group[1]	Straight-breds	Single Crosses	Straight-breds	Single Crosses	Straight-breds	Single Crosses
No. cows exposed[2]	13	14	13	14	13	13
No. calves born[3]	9	14	9	11	10	11
Calving percent, born	69.2	100.0	69.2	78.6	76.9	84.6
Av. birth date	2/17/62	2/15/62	2/17/62	2/15/62	3/01/62	2/25/62
Av. birth wt.	62.2	68.7	55.9	64.5	66.2	74.8
No. calves weaned	9	13	9	11	9	10
Calving percent, weaned[4]	69.2	92.9	69.2	78.6	69.2	76.9
Av. weaning age, days	212.6	212.0	213.4	212.0	198.9	203.8
Adj. ADG[5]	1.43	1.66	1.44	1.67	1.56	1.84
Av. type sc.[6]	10.78	11.21	12.07	11.97	9.89	11.20
Av. condition score[6]	9.00	9.39	10.52	10.33	8.11	9.57

1 - Purebreds, grade, line, backcross, three-breed cross, treatment, etc.
2 - Total number put in breeding herd
3 - Total number born, dead + alive
4 - Number weaned, divided by number of cows exposed
5 - Indicate adjustments:

6 - 15, 16, and 17 = Fancy
12, 13, and 14 = Choice
9, 10, and 11 = Good
6, 7, and 8 = Medium

(b) Dams used were: Straightbreds - Angus, Brahman, Brangus, and Hereford
Single crosses - A-B, A-BA, A-H; B-A, B-BA, B-H; BA-A, BA-B, BA-H; H-A, H-B, H-BA; C-A, C-B, C-BA, C-H; and S-A, S-B, S-BA, S-H.

FORM I
COW PRODUCTION, 1962 CALF CROP

Louisiana State

Location	BatonRouge	BatonRouge	BatonRouge	BatonRouge	BatonRouge	BatonRouge
Breed of sire	Brah. 1258	Brah. 1258	Brang. 787	Brang. 787	Brang. 666	Brang. 666
Breed of dam	(b)	(b)	(b)	(b)	(b)	(b)
Line or group[1]	Straight-breds	Single Crosses	Straight-breds	Single Crosses	Straight-breds	Single Crosses
No. cows exposed[2]	13	14	15	12	15	12
No. calves born[3]	12	12*	12	10	13	11
Calving per-cent, born	92.3	78.6	80.0	83.3	86.7	91.7
Av. birth date	2/26/62	2/23/62	3/04/62	2/26/62	2/12/62	2/14/62
Av. birth wt.	71.0	76.8	72.6	80.6	68.2	73.1
No. calves weaned	10	10	8	10	13	11
Calving per-cent, weaned[4]	76.9	71.4	53.3	83.3	86.7	91.7
Av. weaning age, days	202.4	206.5	193.1	203.9	215.5	215.7
Adj. ADG[5]	1.74	1.94	1.67	1.88	1.53	1.76
Av. type sc.[6]	9.90	10.33	9.88	10.53	10.36	10.67
Av. cond. sc.[6]	8.57	9.07	8.19	8.80	8.64	9.15

1 - Purebreds, grade, line, backcross, three-breed cross, treatment, etc.
2 - Total number put in breeding herd
3 - Total number born, dead + alive
4 - Number weaned, divided by number of cows exposed
5 - Indicate adjustments:

6 - 15, 16, and 17 = Fancy
12, 13, and 14 = Choice
9, 10, and 11 = Good
6, 7, and 8 = Medium

* Twin calves in this group.

(b) Dams were: Straightbreds - Angus, Brahman, Brangus, and Hereford
Single crosses - A-B, A-BA, A-H; B-A, B-BA, B-H; BA-A, BA-B, BA-H; H-A, H-B, H-BA; C-A, C-B, C-BA, C-H; and S-A, S-B, S-BA, S-H.

FORM I
COW PRODUCTION, 1962 CALF CROP

Louisiana State

Location	BatonRouge	BatonRouge	BatonRouge	BatonRouge	BatonRouge	BatonRouge
Breed of sire	Charol. 037	Charol. 037	Charol.096	Charol.096	Hereford 72	Hereford 72
Breed of dam	(b)	(b)	(b)	(b)	(b)	(b)
Line or group[1]	Straight-breds	Single crosses	Straight-breds	Single crosses	Straight-breds	Single crosses
No. cows exposed[2]	7	19	8	20	14	12
No. calves born[3]	4	10	1	6	11	8
Calving per-cent, born	57.1	52.6	12.5	30.0	78.6	66.7
Av. birth date	3/05/62	2/23/62	2/08/62	3/01/62	2/22/62	2/23/62
Av. birth wt.	71.8	76.9	72.0	81.3	69.2	70.8
No. calves weaned	4	8	1	5	11	8
Calving per-cent, weaned[4]	57.1	42.1	12.5	25.0	78.6	66.7
Av. weaning age, days	197.2	203.2	222.0	202.8	208.3	207.1
Adj. ADG[5]	1.64	1.92	1.22	1.85	1.57	1.82
Av. type sc.[6]	11.00	11.61	10.00	11.67	11.24	11.88
Av. cond. sc.[6]	8.34	8.96	7.67	9.27	9.27	10.21

1 - Purebreds, grade, line, backcross, three-breed cross, treatment, etc.
2 - Total number put in breeding herd
3 - Total number born, dead + alive
4 - Number weaned, divided by number of cows exposed
5 - Indicate adjustments:

6 - 15, 16, and 17 = Fancy
12, 13, and 14 = Choice
9, 10, and 11 = Good
6, 7, and 8 = Medium

(b) Dams were: Straightbreds - Angus, Brahman, Brangus, and Hereford
Single crosses - A-B, A-BA, A-H; B-A, B-BA, B-H; BA-A, BA-B, BA-H; H-A, H-B, H-BA; C-A, C-B, C-BA, C-H; and S-A, S-B, S-BA, S-H.

FORM I
COW PRODUCTION, 1962 CALF CROP

Louisiana State

Location	BatonRouge	BatonRouge	BatonRouge	BatonRouge	BatonRouge	BatonRouge
Breed of sire	Hereford 801	Hereford 801	Shorthorn 158	Shorthorn 158	Shorthorn W2	Shorthorn W2
Breed of dam	(b)	(b)	(b)	(b)	(b)	(b)
Line or group[1]	Straight-breds	Single crosses	Straight-breds	Single crosses	Straight-breds	Single crosses
No. cows exposed[2]	12	12	7	20	8	19
No. calves born[3]	9	12	2	12	6	13
Calving percent, born	75.0	100.0	28.6	60.0	75.0	68.4
Av. birth date	3/04/62	2/23/62	3/04/62	3/03/62	2/18/62	2/22/62
Av. birth wt.	67.6	72.6	59.0	71.7	62.7	68.2
No. calves weaned	9	12	2	12	5	12
Calving percent, weaned[4]	75.0	100.0	28.6	60.0	62.5	63.2
Av. weaning age, days	198.2	207.3	198.0	199.2	218.6	210.8
Adj. ADG[5]	1.41	1.74	1.43	1.70	1.41	1.67
Av. type sc.[6]	10.78	12.19	11.34	11.19	11.20	12.00
Av. cond. sc.[6]	9.04	10.33	8.84	9.42	9.27	10.32

1 - Purebreds, grade, line, backcross, three-breed cross, treatment, etc.
2 - Total number put in breeding herd
3 - Total number born, dead + alive
4 - Number weaned, divided by number of cows exposed
5 - Indicate adjustments:

6 - 15, 16, and 17 = Fancy
12, 13, and 14 = Choice
9, 10, and 11 = Good
6, 7, and 8 = Medium

(b) Dams were: Straightbreds - Angus, Brahman, Brangus, and Hereford
Single crosses - A-B, A-BA, A-H; B-A, B-BA, B-H; BA-A, BA-B, BA-H; H-A, H-B, H-BA; C-A, C-B, C-BA, C-H; and S-A, S-B, S-BA, S-H.

FORM I
COW PRODUCTION, 1962 CALF CROP

Louisiana State

Location	BatonRouge	BatonRouge				
Breed of sire	Charol.220	Charol.288				
Breed of dam	Charolais-X	Charolais-X				
Line or group[1]	Single crosses	Back-crosses				
No. cows exposed[2]	30	14				
No. calves born[3]	28	11				
Calving per-cent, born	93.3	78.6				
Av. birth date	2/23/62	3/02/62				
Av. birth wt.	80.6	75.6				
No. calves weaned	27*	10				
Calving per-cent, weaned[4]	90.0	71.4				
Av. weaning age, days	210.2	201.2				
Adj. ADG[5]	1.87	1.76				
Av. type sc.[6]	11.76	11.43				
Av. cond. sc.[6]	9.25	8.90				

1 - Purebreds, grade, line, backcross, three-breed cross, treatment, etc.
2 - Total number put in breeding herd
3 - Total number born, dead + alive
4 - Number weaned, divided by number of cows exposed
5 - Indicate adjustments:

6 - 15, 16, and 17 = Fancy
12, 13, and 14 = Choice
9, 10, and 11 = Good
6, 7, and 8 = Medium

*Eight calves transferred to another test before weaning data were collected.

FORM II
POSTWEANING PERFORMANCE OF CALVES FED IN 1962

Louisiana State

Location	BatonRouge	BatonRouge	BatonRouge	BatonRouge	BatonRouge	BatonRouge
Breed of sire	Angus 660	Angus 679	Brah. 411	Brah. 263	Brang. 666	Brang. 17
Breed of dam	(b)	(b)	(b)	(b)	(b)	(b)
Line or group[1]	(c)	(c)	(c)	(c)	(c)	(c)
Bulls: No. in group						
Bulls: Feed regime[2]						
Bulls: Av. init. age						
Bulls: Av. init. wt.						
Bulls: Av.no.da.fed						
Bulls: Av. final wt.						
Bulls: ADG on test						
Bulls: Av. type sc.						
Bulls: Av. type sc.						
Bulls: Av. cond. sc.						
Bulls: Av. inbreeding						
Heifers: No. in group						
Heifers: Feed regime[2]						
Heifers: Av. init. age						
Heifers: Av. init. wt.						
Heifers: Av.no.da.fed						
Heifers: Av. final wt.						
Heifers: ADG on test						
Heifers: Av. type sc.						
Heifers: Av. cond. sc.						
Heifers: Av. inbreeding						
Steers: No. in group	9	8	6	6	8	10
Steers: Feed regime[2]						
Steers: Av. init. age	241	228	235	238	233	228
Steers: Av. init. wt.	386.1	453.1	435.0	465.9	495.7	469.0
Steers: Av.no.da.fed	216	216	216	216	216	216
Steers: Av. final wt.	764.4	887.5	788.3	781.7	893.6	895.5
Steers: ADG on test	1.75	2.01	1.64	1.46	1.84	1.98
Steers: Av. type sc.						
Steers: Av. cond. sc.	10.78	11.78	8.75	8.54	10.29	10.12
Steers: Av. inbreeding						

1 - Show whether station-owned or cooperator-owned, in addition to other group designation.

2 - Feed regime:

	BULLS	HEIFERS	STEERS
How fed - full, limited, etc.			Full-fed concentrate ration, hay free choice
Pounds/day over feeding period			Conc. Ration: 16.8 lb./head Hay: 2.3 lb./head
Ration:			Conc. Ration: 2 parts steel-cut yellow corn 1-1/2 parts crimped oats 1 part wheat bran 1/2 part CSM 1 part dehy. alfalfa leaf meal

(b) Dams: Straightbreds - Angus, Brahman, Brangus, and Hereford
Single crosses - A-B, A-BA, A-H; B-A, B-BA, B-H; BA-A, BA-B, BA-H; H-A, H-B, H-BA; C-A, C-B, C-BA, C-H; and S-A, S-B, S-BA, S-H.

(c) Straightbreds, single crosses, back-crosses, and three-breed crosses.

FORM II
POSTWEANING PERFORMANCE OF CALVES FED IN 1962

Louisiana State

	Location	BatonRouge	BatonRouge	BatonRouge	BatonRouge	BatonRouge	BatonRouge
	Breed of sire	Charol.17	Charol.17	Hereford340	Hereford72	S-horn W2	S-horn W2
	Breed of dam	(b)	(b)	(b)	(b)	(b)	(b)
	Line or group[1]	(c)	(c)	(c)	(c)	(c)	(c)
Bulls	No. in group						
	Feed regime[2]						
	Av. init. age						
	Av. init. wt.						
	Av.no.da.fed						
	Av. final wt.						
	ADG on test						
	Av. type sc.						
	Av. cond. sc.						
	Av. inbreeding						
Heifers	No. in group						
	Feed regime[2]						
	Av. init. age						
	Av. init. wt.						
	Av.no.da.fed						
	Av. final wt.						
	ADG on test						
	Av. type sc.						
	Av. cond. sc.						
	Av. inbreeding						
Steers	No. in group	8	8	6	8	6	8
	Feed regime[2]						
	Av. init. age	205	204	240	244	221	220
	Av. init. wt.	425.7	427.5	468.3	493.2	460.8	464.4
	Av.no.da.fed	216	216	216	216	216	216
	Av. final wt.	930.0	867.5	853.3	939.4	838.3	850.6
	ADG on test	2.34	2.04	1.78	2.06	1.75	1.79
	Av. type sc.						
	Av. cond. sc.	9.00	8.66	10.79	11.41	11.00	11.44
	Av. inbreeding						

1 - Show whether station-owned or cooperator-owned, in addition to other group designation.

2 - Feed regime:

	BULLS	HEIFERS	STEERS
How fed - full, limited, etc.			Full-fed concentrate ration, hay free choice
Pounds/day over feeding period			Conc. ration: 16.8 lbs./head Hay: 2.3 lbs./head
Ration:			Conc. Ration: 2 parts steel-cut yellow corn 1-1/2 parts crimped oats 1 part wheat bran 1/2 part CSM 1 part dehy. alfalfaleaf-meal

(b) Dams: Straightbreds - Angus, Brahman, Brangus, and Hereford
Single Crosses - A-B, A-BA, A-H; B-A, B-BA, B-H; BA-A, BA-B, BA-H; H-A, A-B, H-BA; C-A, C-B, C-BA, C-H; and S-A, S-B, S-BA, S-H.

(c) Straightbreds, single crosses, back-crosses, and three-breed crosses.

FORM II
POSTWEANING PERFORMANCE OF CALVES FED IN 1962

Louisiana State

Location	BatonRouge	BatonRouge	BatonRouge	BatonRouge		
Breed of sire	(a)	(a)	(a)	(a)		
Breed of dam	(b)	(b)	(b)	(b)		
Line or group[1]	St.-bred	Singlecross	Backcross	3-breed cr.		
Bulls: No. in group						
Bulls: Feed regime[2]						
Bulls: Av. init. age						
Bulls: Av. init. wt.						
Bulls: Av.no.da.fed						
Bulls: Av. final wt.						
Bulls: ADG on test						
Bulls: Av. type sc.						
Bulls: Av. cond. sc.						
Bulls: Av. inbreeding						
Heifers: No. in group						
Heifers: Feed regime[2]						
Heifers: Av. init. age						
Heifers: Av. init. wt.						
Heifers: Av.no.da.fed						
Heifers: Av. final wt.						
Heifers: ADG on test						
Heifers: Av. type sc.						
Heifers: Av. cond. sc.						
Heifers: Av. inbreeding						
Steers: No. in group	16	16	26	33		
Steers: Feed regime[2]						
Steers: Av. init. age	235	235	224	224		
Steers: Av. init. wt.	392.5	437.7	386.5	473.0		
Steers: Av.no.da.fed	216	216	216	216		
Steers: Av. final wt.	762.2	850.6	845.0	898.6		
Steers: ADG on test	1.71	1.93	1.79	1.97		
Steers: Av. type sc.						
Steers: Av. cond. sc.	9.69	10.09	9.75	10.75		
Steers: Av. inbreeding						

1 - Show whether station-owned or cooperator-owned, in addition to other group designation (STATION OWNED)

2 - Feed regime:

	BULLS	HEIFERS	STEERS
How fed - full, limited, etc.			Full-fed concentrate ration, hay free choice
Pounds/day over feeding period			Conc. Ration: 16.8 lbs./head Hay: 2.3 lbs./head
Ration:			Concentrate Ration:
(a) Sires used:	Angus, Brahman, Brangus, Charolais Hereford, and Shorthorn		2 parts steel-cut yellow corn 1-1/2 parts crimped oats 1 part wheat bran
(b) Dams used:	Straightbreds - Angus, Brahman, Brangus, and Hereford Single crosses - A-B, A-BA, A-H; B-A, B-BA, B-H; BA-A, BA-B, BA-H; H-A, H-B, H-BA; C-A, C-B, C-BA,		1/2 part CSM 1 part dehy. alfalfaleaf-meal C-H; and S-A, S-B, S-BA, S-H.

FORM III
SLAUGHTER DATA, 1962

Louisiana State

Location	BatonRouge	BatonRouge	BatonRouge	BatonRouge	BatonRouge	BatonRouge
Breed of sire	Angus 660	Angus 679	Brah. 263	Brah. 411	Brang. 666	Brang.17
Breed of dam	(b)	(b)	(b)	(b)	(b)	(b)
Line or group	(c)	(c)	(c)	(c)	(c)	(c)
Sex	Male	Male	Male	Male	Male	Male
Age at slaughter	457	444	454	451	449	444
No. slaughtered	9	8	6	6	8	10
Days in feedlot	216	216	216	216	216	216
Final feedlot wt.	764.4	887.5	781.7	788.3	893.6	895.5
Slaughter wt., live	764.4	887.5	781.7	788.3	893.6	895.5
Carcass wt., cold	459.6	555.6	472.2	484.2	537.0	549.7
Dressing percent, cold	59.98	62.56	60.39	61.47	59.82	61.32
Carcass grade, quality	12.1	12.1	9.0	9.7	11.6	11.7
Carcass grade, cutability	4.3	4.1	3.0	2.9	3.7	4.2
Est. percent kidney fat	3.8	3.8	2.0	2.5	3.8	4.3
Rib-eye area/100 lbs. carcass	1.80	1.80	1.90	1.90	1.80	1.80
Marbling score	10.6	9.6	4.2	5.5	9.6	9.8
Fat thickness over rib eye[1]	0.93	0.99	0.58	0.59	0.79	0.98
W-B Shear force, pounds[2]	20.54	18.14	24.82	22.64	21.35	21.95

1 - Use one measure - if not, indicate method.

2 - Indicate size of core used and how meat was cooked.
Meat cooked in deep fat, 1-inch core.

(b) Dams used: Straightbreds - Angus, Brahman, Brangus, and Hereford
Single crosses - A-B, A-BA, A-H; B-A, B-BA, B-H; BA-A, BA-B, BA-H; H-A
H-B, H-BA; C-A, C-B, C-BA, C-H; and S-A, S-B, S-BA, S-H.

(c) Straightbreds, single crosses, backcrosses, and three-breed crosses.

FORM III
SLAUGHTER DATA, 1962

Louisiana State

Location	BatonRouge	BatonRouge	BatonRouge	BatonRouge	BatonRouge	BatonRouge
Breed of sire	Charolais 17	Charolais 17 (A.I.)	Hereford 340	Hereford 72	Shorthorn W2	Shorthorn W2 (A.I.)
Breed of dam	(b)	(b)	(b)	(b)	(b)	(b)
Line or group	(c)	(c)	(c)	(c)	(c)	(c)
Sex	Male	Male	Male	Male	Male	Male
Age at slaughter	421	420	456	460	437	436
No. slaughtered	8	8	6	8	6	8
Days in feedlot	216	216	216	216	216	216
Final feedlot wt.	930.0	867.5	853.3	939.4	838.3	850.6
Slaughter wt., live	930.0	867.5	853.3	939.4	838.3	850.6
Carcass wt., cold	549.7	518.6	526.5	577.1	519.2	528.0
Dressing percent, cold	59.03	59.80	61.48	61.17	61.92	61.95
Carcass grade, quality	10.7	11.0	11.8	11.6	10.8	11.8
Carcass grade, cutability	2.8	2.7	4.0	4.6	3.9	3.9
Est. percent kidney fat	3.2	3.1	3.8	3.9	4.5	3.9
Rib-eye area/100 lbs. carcass	2.00	1.90	2.00	1.70	1.80	1.80
Marbling score	8.9	7.9	10.7	10.1	8.0	10.5
Fat thickness over rib eye[1]	0.49	0.44	0.82	0.96	0.79	0.80
W-B shear force, pounds[2]	17.83	16.78	20.41	18.75	21.81	18.74

1 - Use one measure - if not, indicate method.

2 - Indicate size of core used and how meat was cooked:
Meat cooked in deep fat, one-inch core

(b) Dams used: Straightbreds - Angus, Brahman, Brangus, and Hereford
Single crosses - A-B, A-BA, A-H; B-A, B-BA, B-H; BA-A, BA-B, BA-H; H-A
H-B, H-BA; C-A, C-B, C-BA, C-H; and S-A, S-B, S-BA, S-H.

(c) Straightbreds, single crosses, back-crosses, and three-breed crosses.

FORM III
SLAUGHTER DATA, 1962

Louisiana State

Location	BatonRouge	BatonRouge	BatonRouge	BatonRouge		
Breed of sire	(a)	(a)	(a)	(a)		
Breed of dam	(b)	(b)	(b)	(b)		
Line or group	Straight-breds	Single crosses	Back-crosses	3-breed crosses		
Sex	Male	Male	Male	Male		
Age at slaughter	451	450	440	440		
No. slaughtered	16	16	26	33		
Days in feedlot	216	216	216	216		
Final feedlot wt.	762.2	850.6	845.0	898.6		
Slaughter wt., live	762.2	850.6	845.0	898.6		
Carcass wt., cold	461.0	516.1	535.6	552.0		
Dressing percent, cold	60.32	60.49	60.96	61.36		
Carcass grade, quality	11.0	10.9	10.6	11.7		
Carcass grade, cutability	3.5	3.7	3.5	4.0		
Est. percent kidney fat	3.1	3.5	3.5	4.1		
Rib-eye area/100 lbs. carcass	1.90	1.90	1.80	1.80		
Marbling score	8.2	8.4	8.3	9.9		
Fat thickness over rib eye[1]	0.72	0.77	0.73	0.86		
W-B shear force, pounds[2]	20.41	20.01	18.96	20.63		

1 - Use one measure - if not, indicate method.

2 - Indicate size of core used and how meat was cooked.
Meat cooked in deep fat, one-inch core

(a) Sires used: Angus, Brahman, Brangus, Charolais, Hereford, and Shorthorn
(b) Dams used: Straightbreds - Angus, Brahman, Brangus, and Hereford
Single crosses - A-B, A-BA, A-H; B-BA, B-A, B-H; BA-A, BA-B, BA-H; H-A H-B, H-BA; C-A, C-B, C-BA, C-H; and S-A, S-B, S-BA, S-H

IBERIA LIVESTOCK EXPERIMENT STATION
Jeanerette, Louisiana

I. PROJECT: AH Line Project d1-6 (revised 1958)

Development of Pure and Crossbred Types of Beef Cattle for the Southeastern United States and the Gulf Coast Region.

II. OBJECTIVES:

To compare the performance of Brangus and Africander-Angus cattle with Angus and Brahman for beef.

To study and evaluate carcass merit and quality of steers and heifers from the various crossbred lines, purebreds, and other crosses.

To assess the progress made with the Brangus by comparing them to the first crosses of the two parent breeds.

To evaluate the combining ability of Angus and Brahman bulls when mated to samples of Brangus and Africander-Angus cows by measuring the growth and carcass merit of the progeny.

To study fertility among the several breed groups under normal management procedures on the station.

III. PERSONNEL:

T. M. DeRouen, W. L. Reynolds, J. W. High, Jr., E. J. Warwick, R. S. Temple, Noah England, A. M. Mullins, and R. M. Boulware.

IV. ACCOMPLISHMENTS DURING THE YEAR:

1. Research results

(a) Calving and weaning performance: There were fourteen single-sire herds consisting of a total of 259 cows. The bulls were put in their respective breeding herds on pasture on April 15, and were removed on July 1, a period of 75 days. Nine Sindhi cows were spread out among the different breeding herds. These cows were sold in the fall after their calves were weaned.

All cows exposed to bulls during the breeding season were palpated for preganacy during September 1961. Conception rates were: Angus and Africander-Angus, 90%; Brangus, 80%; Brahman, 74%; and F_1 cows 100%. The over-all conception rate was 84%.

Calving began on January 15 and continued until April 23. Calving losses during the first 72 hours following parturition were lower than usual for 1962. Two factors which may be responsible include: (a) the calving season was moved from January 1 to January 15; and (b) during calving the weather was mild and dry.

Mortality of calves during the past several years has averaged about 10 percent. However, calving losses in 1962 were six percent. A summary of calving by breed groups is shown in Table 1.

TABLE 1. Summary of Calving for 1962

Breed of Cow	Born		Total	Percent Live
	Live	Dead		
Brangus	76	3	79	96
Africander-Angus	46	3	49	94
Angus	30	1	31	97
Brahman	26	3	29	90
Cross F_1 (Angus x Brahman)	7	1	8	88
Totals and Means	185	11	196	94

The causes of these calving losses are shown in Table 2.

TABLE 2. Analysis of Calf Losses for 1962

Breed of Cow	Still-born	Drowned	Ruptured Navel	Abor-tion	Found Dead 36 Hours	
					Less	After
Brangus	1	-	-	1	-	1
Africander-Angus	-	1	1	-	1	-
Angus	1	-	-	-	-	-
Brahman	-	1	-	-	2*	-
Cross F_1 (A x B)	1	-	-	-	-	-
Totals	3	2	1	1	3	1

* Twins - small and weak.

A summary of birth information by various breeding groups is shown on Form I.

(b) Milk production of cows: An estimate of the milk produced by all the cows in the breeding project was obtained by separating the calves from their dams overnight for approximately 16 hours. The calves were weighed before and after nursing, with the difference in weights representing the milk production of the cow for the period.

These milk weights were obtained on two different occasions about one month apart. Milk production, as shown in Table 3 for the various breed groups, represents an average of the two weights.

TABLE 3. Summary of Milk Production of Cows, 1962

Breed of Cow	No. Cows	Age 3 Yrs. Lbs. Milk	Age 4 Yrs. and over Lbs. Milk	Over-all
Angus	5	6.45	-	
Angus	25	-	8.20	7.91
Brahman	3	6.75	-	
Brahman	22	-	7.08	7.04
Africander-Angus	6	6.00	-	
Africander-Angus	40	-	7.48	7.28
Brangus	16	7.53	-	
Brangus	61	-	8.45	8.26
F_1 Crossbred	8	9.81	-	9.81

(c) Weaning data: Weaning information by breeding groups for straightbreds and crosses is given on Form I. In the straightbred herds the Brangus had the highest rate of gain up to weaning (1.68). The Brahman gained 1.56 pounds per day, while the Africander-Angus and Angus gained 1.46 and 1.44 pounds per day, respectively. Angus x Brahman and Brahman x Angus F_1 calves gained well to weaning (1.85 and 1.79, respectively), as did the calves produced from Brangus bulls mated to F_1 cows (1.81).

The combining ability study is an attempt to evaluate the performance of the progeny - steers and heifers - of Angus and Brahman bulls mated to samples of Brangus and Africander-Angus cows. Calves sired by Brahman bulls gained slightly faster up to weaning than those sired by Angus bulls. The type score of calves sired by Angus bulls was higher than that of calves sired by Brahman bulls. Condition score at weaning was about the same for both breeds of bulls. Calves out of Brangus cows gained considerably faster than calves out of Africander-Angus cows up to weaning.

(d) Post-weaning performance: Bull calves were selected for replacement at weaning in September 1961, and were placed on the gain-evaluation test for 140 days. Each calf was fed in an individual pen.

Brangus bulls made the most rapid gains. They were followed by the Angus, Brahman, and Africander-Angus, respectively. One of the two Africander-Angus bulls became ill toward the latter part of the feed period and his gains were adversely affected. Shortly after finishing the test this bull died and was posted. It was found that urinary calculi had blocked the kidney and the urethra.

Feed efficiency of these bulls by breed groups was: Brangus, 7.52 pounds of feed per pound of gain; Brahman, 7.61 pounds; Angus, 7.63 pounds; and Africander-Angus, 9.36 pounds. Results of this test are shown on Form II.

The phase of the project dealing with straight and crossbred steers consisted of Angus, Brahman, Brangus, Africander-Angus, and F_1 crossbred steers (Angus x Brahman and Brahman x Angus). Brangus steers gained more rapidly than the other groups, while the F_1 crossbred steers and the Angus steers made similar gains. Brahman steers gained slightly faster than the Africander-Angus, which were last.

Angus steers had the highest condition score, while the Brahmans had the lowest. The other breed groups were intermediate between the purebred groups. A summary of these results is shown on Form II.

Feed efficiency of the steers was obtained by feeding them in breed groups. Brahman steers required 8.48 pounds of feed per pound of gain; F_1 crossbred, 10.39; Brangus, 10.92; Africander-Angus, 11.08; and Angus, 11.60.

In general, the combining ability steers and heifers sired by Angus bulls gained more rapidly on feed and achieved a higher type and condition grade than those sired by Brahman bulls and out of similar cows. Steers and heifers out of Brangus cows gained faster than those out of Africander-Angus cows.

There were a few calves fed which were out of Sindhi cows mated to Angus or Brahman bulls. A few calves sired by Sindhi bulls out of Brangus and Africander-Angus cows were also fed out. The numbers are small and will be added to previous data. These data are shown on Form II.

(e) Carcass data: The carcass data for straightbred and crossbred steers indicated that Angus steers had the highest carcass quality, largest rib-eye area per 100 pounds of carcass, highest marbling score, and were second in tenderness. Brangus steers ranked second in carcass quality, but were next to last in tenderness, while the Brahman steers were least tender. Africander-Angus steers had the most tender lean. The F_1 steers produced lean that was intermediate in tenderness between the two purebreds. The average carcass grade for the F_1 steers was higher than the Africander-Angus. Brahman steers produced carcasses with the lowest grade. The slaughter data is summarized in Form III.

The federal grader commented that the carcasses, in general, appeared somewhat watery, indicating a lack of maturity. These cattle were approximately 13-14 months old at slaughter. The lean of the straight Brahman carcasses appeared lighter in color than the other breed groups and indicated a lack of maturity.

As far as the combining ability steers and heifers were concerned, the carcasses of calves sired by Angus and Brahman bulls had about the same grade. This was true for calves out of both Brangus and Africander-Angus cows. The carcass quality of heifer calves out of Brangus cows was superior to those out of Africander-Angus cows. Steers sired by Angus bulls were more tender (shear test) than those sired by Brahman bulls. However, the reverse was true for the heifers. Steers out of Africander-Angus cows were more tender than those out of Brangus cows, while the heifers out of Brangus cows were more tender than those out of Africander-Angus cows. These data are given in Form III.

(f) Post-weaning breeding performance of beef cattle in the Gulf Coast region: For three years, experiments have been conducted to investigate the fertility of lactating cull cows which failed to become pregnant in the regular 75-day breeding season. This year cows were separated into three groups. Group 1 cows were exposed to a bull for 27 days prior to weaning the calves and then for another 42 days after the calves were weaned. At weaning of the calves, those cows in Group 2 were placed with the bull for 42 days. Group 3 consisted of cows which received supplemental feed for 42 days after calving while with a fertile bull.

TABLE 4. Reproductive Performance of Cows Immediately Prior to and after Weaning the Calves

Classification	No. showing heat	Percent pregnant
Group 1. - Exposed for 27 days while nursing a calf	14	43
Group 1. and 2. - Exposed for 27 days after calves were weaned	13	62
Group 3. - Supplemental feed, exposed for 27 days after calves were weaned	8	88
Group 1. and 2. - Exposed from 27 days through 42nd day	7	14
Group 3. Exposed from 27th through 42nd day	3	100

These data show, as has previous years' work, that higher percentage of pregnancy was obtained by breeding cows after the calves were weaned. Supplementation of cows with extra feed also appears to be advantageous in increasing pregnancy rate.

Table 5 shows the effect of condition of cows at the time when the calves were weaned on subsequent pregnancy rate during the study. These data show that the chances of conception of cows after weaning the calves is low if they are in very thin flesh at this time.

TABLE 5. Pregnancy Rate of Cows Classified by Condition at the Time the Calves Were Weaned

Classification	No.	No. showing heat	Percent showing heat	No. Preg.	Percent Preg.
Cows - med. to fat	--	--	--	--	--
Cows - med. flesh	14	14	100	10	71
Cows - thin flesh	15	14	93	13	93
Cows - very thin flesh	8	6	75	2	33

(g) Age and weight at puberty of two-breed cross and purebred heifers: Two hundred and nine replacement heifers have been observed for age and weight at puberty from 1958 through 1962. Angus, Brahman, Brangus, Africander-Angus, and first-cross Angus x Brahman and Brahman x Angus heifers were represented. Heat checks were also made on 61 heifers placed on full-feed after weaning for 168 days. These crossbred heifers resulted from mating Angus and Brahman bulls to Brangus, Africander-Angus, or Sindhi cows and Sindhi bulls to Brangus or Africander-Angus cows. At the end of the feeding period they were slaughtered and the reproductive organs examined for ovarian activity.

Sterile teaser bulls were placed with all the heifers at weaning and painted daily with a grease paint pigment mixture on the brisket. The heifers were checked daily for evidence of heat and palpated periodically for ovarian activity.

The average age and weight at puberty of the replacement heifers is shown in Table 6. These data indicate that Angus heifers mature sexually at a much younger age and weight than do the Africander-Angus or Brangus heifers, both of which contain Brahman breeding. The faster-growing first-cross Brahman x Angus and Angus x Brahman heifers reached puberty at an earlier age than the Brangus and Africander-Angus, but at a heavier weight. The data also show the slow sexual maturity of the Brahman heifers which averaged over 24 months of age at the time of first heat.

TABLE 6. Average Age and Weight at Puberty of Replacement Heifers

Breed	Number	Av. age at puberty (days)	Av. wt. at puberty (lbs.)
Angus	26	433	536
Africander-Angus	35	542	623
Brangus	102	531	639
F_1 crosses (B x A and A x B)	29	460	666
Brahman	12	816	706

Heat checks were made for puberty on the 61 crossbred heifer calves placed on full-feed for 168 days after weaning. Sixty-nine percent of the crossbred calves sired by Angus bulls had shown puberty by the end of the 168 day feeding period, as compared to 29 percent and 17 percent, respectively, for calves sired by Sindhi and Brahman bulls.

(h) Effect of growth rate of heifers on subsequent fertility rate: A study has been made of the effect of rate of growth from six months to two years of age on the subsequent calving percent at three years of age. In general, lightweight calves at either 180 days of age or at weaning had lower subsequent fertility rates than heavier calves. This was more apparent in the Brangus than in the Africander-Angus heifers. Lightweight heifers of Africander-Angus or Brangus breeding at 18 months or 24 months of age were consistently lower in calving rate than heifers of heavier weights. The average subsequent fertility rate of heifers weighing less than 400 pounds at weaning and those weighing more than 400 pounds was 66 and 80 percent, respectively. Heifers weighing less than 600 pounds at two years of age had a 20 percent lower calving rate than heifers weighing more than this amount. These data show that culling of heifers on the basis of weaning weight, weight at 18 months, or weight at 24 months of age could improve calving percentages.

2. Improvement of facilities

New fences were constructed in the marsh to facilitate handling of cattle. Concrete was poured and four pens were constructed for feeding cattle. Concrete was laid under the north beef barn. A new shed was constructed for storing hay and machinery. A new and stronger squeeze chute for working cattle was purchased. Two silage wagons, which will aid in the distribution of feed to cattle on pasture, were leased.

V. FUTURE PLANS:

1. Projects

Except for the combining ability studies, the present breeding project will be terminated when the calves dropped in the spring of 1963 complete the dry-lot feeding period and are slaughtered. Two or three more years of data are needed in the combining ability study.

Three new breeding projects are currently being considered for the station. A genetic-environmental interaction which would be integrated with the reproduction-physiology studies has been proposed. Two divergent breeds and crosses would be used in this study. Selection for over-all carcass merit is another project being considered. This would involve only the Brangus cattle. Another proposed project includes a study of coat cover and its relationship to adaptability and to economic traits, which would involve only the Angus cattle.

2. Improvements

The remaining marsh land will be cleared, crowned, drained, and seeded to suitable grasses and legumes. Additional fences and cross-fences will be constructed for better utilization of pasture. Drainage will be improved in many of the pastures. Existing residences and barns will be repaired and painted.

VI. PUBLICATIONS:

DeRouen, T. M., W. L. Reynolds, J. W. High, Jr., R. S. Temple, and Noah England. 1962. Development of pure and crossbred types of beef cattle for the Southeastern United States and the Gulf Coast region. Animal Industry Reports, Louisiana State University.

DeRouen, T. M., W. L. Reynolds, A. M. Mullins, R. F. Boulware, R. S. Temple, and S. L. Cathcart. 1962. Gains and carcass merit of steers being studied in crossbreeding at the Iberia Station. Louisiana Agriculture, Vol. 5, No. 3.

Reynolds, W. L., T. M. DeRouen, and J. W. High, Jr. 1962. Pregnancy diagnosis of beef cattle. Louisiana Agriculture, Vol. 6, No. 1.

Station annual reports

VII. PUBLICATIONS PLANNED:

A selection index for beef cattle in a sub-tropical environment

A review of the crossbreeding project

A study of shrink in cattle

Evaluation of growth of bulls on the ROP test

Submitted by: T. M. DeRouen

FORM I
COW PRODUCTION, 1962 CALF CROP

Louisiana, Jeanerette State

Location	Jeanerette	Jeanerette	Jeanerette	Jeanerette	Jeanerette	Jeanerette
Breed of sire	Angus	Brahman	Angus	Brahman	Brangus	Brangus
Breed of dam	Angus	Brahman	Brahman	Angus	Brangus	A x BA (F_1)
Line or group[1]	Purebred	Purebred	Crossbred	Crossbred	Brangus	Brangus
No. cows exposed[2]	28	26	13	13	70	10
No. calves born[3]	25	19	10	6	53	9
Calving percent, born	89	73	77	46	76	90
Av. birth date	2/05/62	3/11/62	2/22/62	2/22/62	2/19/62	2/17/62
Av. birth wt.	62	59	63	75	68	66
No. calves weaned	25	16	10	5	48	8
Calving percent, weaned[4]	89	62	77	38	68	80
Av. weaning age, days	226	189	209	202	210	213
Adj. ADG[5]	1.44	1.56	1.85	1.79	1.68	1.81
Av. type sc.[6]	10.7	9.6	10.2	9.2	9.3	10.5
Av. cond. sc.[6]	8.0	7.8	8.9	8.4	7.5	9.0

1 - Purebreds, grade, line, backcross, three-breed cross, treatment, etc.
2 - Total number put in breeding herd
3 - Total number born, dead + alive
4 - Number weaned, divided by number of cows exposed
5 - Indicate adjustments:

sex of calf, age of dam, to a steer basis
205-day weight

6 - 15, 16, and 16 = Fancy
12, 13, and 14 = Choice
9, 10, and 11 = Good
6, 7, and 8 = Medium

FORM I
COW PRODUCTION, 1962 CALF CROP

Louisiana, Jeanerette State

Location	Jeanerette	Jeanerette	Jeanerette	Jeanerette	Jeanerette	
Breed of sire	Afri.-Ang.	Angus	Brahman	Angus	Brahman	
Breed of dam	Afri.-Ang.	Brangus	Brangus	Afri.-Ang.	Afri.-Ang.	
Line or group[1]	Afri.-Ang.	Combining Ability	Combining Ability	Combining Ability	Combining Ability	
No. cows exposed[2]	36	16	16	12	12	
No. calves born[3]	32	13	12	9	8	
Calving percent, born	89	81	75	75	67	
Av. birth date	2/24/62	2/05/62	3/01/62	2/15/62	3/06/62	
Av. birth wt.	68	61	72	66	72	
No. calves weaned	30	12	11	8	8	
Calving percent, weaned[4]	83	75	69	67	67	
Av. weaning age, days	209	225	201	215	196	
Adj. ADG[5]	1.46	1.67	1.79	1.55	1.58	
Av. type sc.[6]	8.6	11.0	9.5	10.1	8.6	
Av. cond. sc.[6]	7.0	8.3	8.2	7.9	7.9	

1 - Purebreds, grade, line, backcross, three-breed cross, treatment, etc.
2 - Total number put in breeding herd
3 - Total number born, dead + alive
4 - Number weaned, divided by number of cows exposed
5 - Indicate adjustments:

sex of calf, age of dam, to a steer basis
205-day weight

6 - 15, 16, and 17 = Fancy
12, 13, and 14 = Choice
9, 10, and 11 = Good
6, 7, and 8 = Medium

FORM II
POSTWEANING PERFORMANCE OF CALVES FED IN 1962

Louisiana, Jeanerette State

Location	Jeanerette	Jeanerette				
Breed of sire	Sindhi	Sindhi				
Breed of dam	Brangus	Afri.-Ang.				
Line or group[1]	Comb.-Ab.	Comb.-Ab.				
Bulls: No. in group						
Feed regime[2]						
Av. init. age						
Av. init. wt.						
Av.no.da.fed						
Av. final wt.						
ADG on test						
Av. type sc.						
Av. inbreeding						
Heifers: No. in group	1	4				
Feed regime[2]						
Av. init. age	272	238				
Av. init. wt.	395	307				
Av.no.da.fed	168	168				
Av. final wt.	570	554				
ADG on test	1.04	1.46				
Av. type sc.						
Av. cond. sc.	7.2	7.3				
Av. inbreeding	none	none				
Steers: No. in group	5	3				
Feed regime[2]						
Av. init. age	243	251				
Av. init. wt.	409	395				
Av.no.da.fed	196	196				
Av. final wt.	796	765				
ADG on test	1.97	1.89				
Av. type sc.	9.7	9.3				
Av. cond. sc.	11.2	10.3				
Av. inbreeding	none	none				

1 - Show whether station-owned or cooperator-owned, in addition to other group designation.

2 - Feed regime:

	BULLS	HEIFERS	STEERS
How fed - full, limited, etc.		Full-fed	Full-fed
Pounds/day over feeding period		20.83 lbs.	21.89 lbs.

Ration: (ALL CATTLE FED THE SAME RATION)

500 lbs.	corn chops	
100 lbs.	CSM (41% protein grade)	
100 lbs.	molasses	
50 lbs.	alfalfa meal	
249 lbs.	cottonseed hulls	
1 lb.	ground oyster shell flour	
1/2 lb.	Vit. A conc./1000 lbs. of feed	

Chemical Analysis:

11.3%	- protein
3.5%	- fat
11.6%	- fiber
13.5%	- HOH
56.2%	- N.F.E.
3.9%	- ash

2033 Vit. A USP units/lb.

FORM II
POSTWEANING PERFORMANCE OF CALVES FED IN 1962

Louisiana, Jeanerette State

	Location	Jeanerette	Jeanerette	Jeanerette	Jeanerette	Jeanerette	Jeanerette
	Breed of sire	Brangus	Afri.-Ang.	Brahman	Angus	Angus	Brahman
	Breed of dam	Brangus	Afri.-Ang.	Brahman	Angus	Brangus	Brangus
	Line or group[1]	Brangus	Afri.-Ang.	Purebred	Purebred	Comb.-Ab.	Comb.-Ab.
Bulls	No. in group	10	2	3	5		
	Feed regime[2]						
	Av. init. age	245	247	215	250		
	Av. init. wt.	488	510	417	442		
	Av.no.da.fed	140	140	140	140		
	Av. final wt.	864	768	693	787		
	ADG on test	2.69	1.84	1.97	2.46		
	Av. type sc.	9.8	8.0	9.0	11.8		
	Av. cond. sc.	9.2	8.1	8.3	10.6		
	Av. inbreeding	11.42	12.33	none	none		
Heifers	No. in group					4	3
	Feed regime[2]						
	Av. init. age					264	238
	Av. init. wt.					460	370
	Av.no.da.fed					168	168
	Av. final wt.					749	700
	ADG on test					1.72	1.96
	Av. type sc.						
	Av. cond. sc.					9.3	7.1
	Av. inbreeding					none	none
Steers	No. in group	12	7	6	6	6	2
	Feed regime[2]						
	Av. init. age	249	251	222	264	255	220
	Av. init. wt.	414	386	303	360	447	440
	Av.no.da.fed	196	196	196	196	196	196
	Av. final wt.	832	746	667	761	885	888
	ADG on test	2.13	1.78	1.86	2.04	2.23	2.24
	Av. type sc.	8.5	8.3	7.5	10.5	9.3	8.5
	Av. cond. sc.	9.0	8.2	7.5	10.9	10.7	8.8
	Av. inbreeding	12.48	14.71	none	none	none	none

1 - Show whether station owned or cooperator owned, in addition to other group designation. (All cattle owned by the Louisiana Agricultural Experiment Sta.)

2 - Feed Regime:

	BULLS	HEIFERS	STEERS
How fed - full, limited, etc.	Full-fed	Full-fed	Full-fed
Pounds/day over feeding period	18.74 lbs.	20.83 lbs.	21.89 lbs.

Ration: (ALL CATTLE FED THE SAME RATION)

500 lbs.	corn chops
100 lbs.	CSM (41% protein grade)
100 lbs.	molasses
50 lbs.	alfalfa meal
249 lbs.	cottonseed hulls
1 lb.	ground oyster shell flour
1/2 lb.	Vitamin A conc./1000 lbs. feed

Chemical Analysis:

11.3%	protein
3.5%	fat
11.6%	fiber
13.5%	HOH
56.2%	N.F.E.
3.9%	ash

2033 Vit. A USP units/lb.

FORM II
POSTWEANING PERFORMANCE OF CALVES FED IN 1962

Louisiana, Jeanerette State

	Location	Jeanerette	Jeanerette	Jeanerette	Jeanerette	Jeanerette	Jeanerette
	Breed of sire	Angus	Angus	Brahman	Brahman	Brahman	Angus
	Breed of dam	Afri.-Ang.	Brahman	Angus	Sindhi	Afri.-Ang.	Sindhi
	Line or group[1]	Comb.-Ab.	F_1	F_1	Comb.-Ab.	Comb.-Ab.	Crossbred
Bulls	No. in group						
	Feed regime[2]						
	Av. init. age						
	Av. init. wt.						
	Av.no.da.fed						
	Av. final wt.						
	ADG on test						
	Av. type sc.						
	Av. cond. sc.						
	Av. inbreeding						
Heifers	No. in group	6			1	4	3
	Feed regime[2]						
	Av. init. age	262			238	226	237
	Av. init. wt.	389			370	366	397
	Av.no.da.fed	168			168	168	168
	Av. final wt.	710			600	646	677
	ADG on test	1.91			1.37	1.67	1.67
	Av. type sc.						
	Av. cond. sc.	9.0			8.7	6.6	8.6
	Av. inbreeding	none			none	none	none
Steers	No. in group	10	9	4	1	1	2
	Feed regime[2]						
	Av. init. age	254	245	228	248	197	275
	Av. init. wt.	422	466	414	520	430	478
	Av.no.da.fed	196	196	196	196	196	196
	Av. final wt.	852	833	906	820	800	795
	ADG on test	2.19	1.87	2.51	1.53	1.89	1.62
	Av. type sc.	9.8	8.1	9.1	8.6	7.8	8.6
	Av. cond. sc.	10.3	8.8	9.6	8.2	8.6	8.9
	Av. inbreeding	none	none	none	none	none	none

1 - Show whether station-owned or cooperator-owned, in addition to other group designation (All cattle owned by the Louisiana Agricultural Experiment Sta.)

2 - Feed regime:

	BULLS	HEIFERS	STEERS
How fed - full, limited, etc.		Full-fed	Full-fed
Pounds/day over feeding period		20.83 lbs.	21.89 lbs.
Ration: (ALL	CATTLE FED THE SAME RATION) 500 lbs. corn chops 100 lbs. CSM (41% protein grade) 100 lbs. molasses 50 lbs. alfalfa meal 249 lbs. cottonseed hulls 1 lb. ground oyster shell flour 1/2 lb. Vit. A conc./1000 lbs. feed		Chemical Analysis: 11.3% - protein 3.5% - fat 11.6% - fiber 13.5% - HOH 56.2% - N.F.E. 3.9% - ash 2033 Vit. A USP units/lb.

FORM III
SLAUGHTER DATA, 1962

Louisiana, Jeanerette State

Location	Jeanerette	Jeanerette	Jeanerette	Jeanerette	Jeanerette	Jeanerette
Breed of sire	Brangus	Afri.-Ang.	Brahman	Angus	Angus	Brahman
Breed of dam	Brangus	Afri.-Ang.	Brahman	Angus	Brangus	Brangus
Line or group	Brangus	Afri.-Ang.	Purebred	Purebred	Comb.-Ab.	Comb.-Ab.
Sex	Steers	Steers	Steers	Steers	Steers	Steers
Age at slaughter	452	454	423	467	458	422
No. slaughtered	12	6	6	6	6	2
Days in feedlot	196	196	196	196	196	196
Final feedlot weight	832	746	667	761	885	888
Slaughter wt., live	813*	746*	651*	771*	878*	860*
Carcass wt., cold	496	445	388	466	546	520
Dressing percent, cold	60.99	59.65	59.60	60.44	62.19	60.46
Carcass grade, quality	11.4**	9.8**	8.7**	12.8**	11.2**	11.0**
Carcass grade, cutability	3.2**	2.8**	2.7**	3.7**	3.5**	2.9**
Ext. percent kidney fat	3.3**	3.1**	2.2**	3.7**	3.9**	2.8**
Rib-eye area/100 lbs. carcass	1.89	1.92	1.99	2.05	1.91	1.89
Marbling score	2.9***	2.2***	1.2***	4.2***	3.2***	3.0***
Fat thickness over rib eye[1]	0.66	0.41	0.55	0.90	0.88	0.81
W-B shear force, pounds[2]	23.00	15.51	27.29	16.00	22.16	24.14

1 - Use one measure - if not, indicate method.
Average of three measures taken at three different points.

2 - Indicate size of core used and how meat was cooked.
One-inch core, deep fat.

* Slaughter weight obtained at plant just before slaughtering.
** Federal grader estimated carcass grade and kidney fat.
*** Marbling score estimated by USDA degrees of marbling chart values.

FORM III
SLAUGHTER DATA, 1962

Louisiana, Jeanerette State

Location	Jeanerette	Jeanerette	Jeanerette	Jeanerette	Jeanerette	Jeanerette
Breed of sire	Angus	Angus	Brahman	Brahman	Brahman	Angus
Breed of dam	Afri.-Ang.	Brahman	Angus	Sindhi	Afri.-Ang.	Sindhi
Line or group	Comb.-Ab.	F_1	F_1	Crossbred	Comb.-Ab.	Crossbred
Sex	Steers	Steers	Steers	Steers	Steers	Steers
Age at slaughter	457	448	431	451	400	478
No. slaughtered	10	9	4	1	1	2
Days in feedlot	196	196	196	196	196	196
Final feedlot wt.	852	833	906	820	800	795
Slaughter wt., live	859	825	889	780	780	735
Carcass wt., cold	533	507	549	462	489	463
Dressing percent, cold	62.04	61.45	61.81	59.23	61.90	62.99
Carcass grade, quality	10.9	9.9	12.5	9.0	11.0	8.5
Carcass grade, cutability	3.4	3.7	3.4	2.8	2.9	3.2
Est. percent, kidney fat	3.6	3.7	4.1	2.0	3.0	3.3
Rib-eye area/100 lbs. carcass	1.91	1.78	1.87	2.01	2.04	1.90
Marbling score	2.4	2.1	3.8	1.5	3.0	1.0
Fat thickness over rib eye[1]	0.82	0.82	0.82	0.54	0.69	0.71
W-B shear force, pounds[2]	18.93	21.22	19.74	21.29	21.83	21.76

1 - Use one measure - if not, indicate method.

2 - Indicate size of core used and how meat was cooked.

FORM III
SLAUGHTER DATA, 1962

Louisiana, Jeanerette State

Location	Jeanerette	Jeanerette	Jeanerette	Jeanerette	Jeanerette	Jeanerette
Breed of sire	Sindhi	Sindhi	Angus	Angus	Angus	Brahman
Breed of dam	Brangus	Afri.-Ang.	Brangus	Afri.-Ang.	Sindhi	Brangus
Line or group	Comb.-Ab.	Comb.-Ab.	Comb.-Ab.	Comb.-Ab.	Crossbred	Comb.-Ab.
Sex	Steers	Steers	Heifers	Heifers	Heifers	Heifers
Age at slaughter	446	454	431	429	411	407
No. slaughtered	5	3	4	6	3	3
Days in feedlot	196	196	168	168	168	168
Final feedlot wt.	796	765	749	710	677	700
Slaughter wt., live	764	745	728*	683*	654*	672*
Carcass wt., cold	482	468	474*	434*	412*	430*
Dressing percent, cold	63.09	62.82	65.11	63.54	63.00	63.99
Carcass grade, quality	11.2	10.3	11.5	10.3	8.0	10.7
Carcass grade, cutability	4.1	3.8	not obtained			
Est. percent, kidney fat	4.3	4.3	9.2	9.4	10.48	8.1
Rib-eye area/100 lbs. carcass	1.88	1.88	2.08	2.22	2.07	2.20
Marbling score	2.5	2.2	5.5	4.7	2.7	4.7
Fat thickness over rib eye[1]	1.01	0.95	0.76	0.69	0.75	0.60
W-B shear force, pounds[2]	28.91	27.82	20.75	21.00	19.17	16.67

1 - Use one measure - if not, indicate method.
Used three measures and averaged.

2 - Indicate size of core used and how meat was cooked.
One-inch core, deep fat.

* Slaughter plant did not have scale in operation. Slaughter weight was estimated from shrink of heifers of previous year that were handled in a similar manner. Consequently, cold carcass weight and dressing percent are an estimate.

FORM III
SLAUGHTER DATA, 1962

Louisiana, Jeanerette State

Location	Jeanerette	Jeanerette	Jeanerette	Jeanerette		
Breed of sire	Brahman	Brahman	Sindhi	Sindhi		
Breed of dam	Afri.-Ang.	Sindhi	Brangus	Afri.-Ang.		
Line or group	Comb.-Ab.	Crossbred	Comb.-Ab.	Comb.-Ab.		
Sex	Heifers	Heifers	Heifers	Heifers		
Age at slaughter	393	406	439	405		
No. slaughtered	4	1	1	4		
Days in feedlot	168	168	168	168		
Final feedlot wt.	646	600	570	554		
Slaughter wt., live	621*	570*	549*	526*		
Carcass wt., cold	394*	360*	359*	342*		
Dressing percent, cold	63.45	63.16	65.39	65.02		
Carcass grade, quality	8.5	10.0	10.0	10.2		
Carcass grade, cutability	not obtained----------					
Est. percent kidney fat	6.7	5.9	6.9	9.13		
Rib-eye area/100 lbs. carcass	2.48	2.22	2.23	2.16		
Marbling score	3.0	5.0	3.0	5.2		
Fat thickness over rib eye[1]	0.41	0.57	0.65	0.65		
W-B shear force, pounds[2]	21.01	15.83	26.66	24.73		

1 - Use one measure - if not, indicate method.

2 - Indicate size of core used and how meat was cooked.

* Slaughter plant did not have scale in operation. Slaughter weight was estimated from shrink of heifers of previous year that were handled in a similar manner. Consequently, cold carcass weight and dressing percnet are an estimate.

MISSISSIPPI STATE UNIVERSITY
Agricultural Experiment Station

I. PROJECT: Hatch 642 (S-10)

Lowered Fertility in the Bovine

II. OBJECTIVES:

To make a survey of the reproductive performance of cattle in the Mississippi Experiment Station system to determine (1) the reproductive efficiency for each herd of the system, and (2) what factors may be contributing to reproductive inefficiency.

To determine the nature of sterility in cows leaving the herd because of low reproductive performance.

To propose and test possible treatments which may increase reproductive efficiency.

III. PERSONNEL:

Bryan Baker, Jr.

IV. ACCOMPLISHMENTS DURING THE YEAR:

In the Mississippi Experiment Station system there are more than 1000 beef and dairy cows in the breeding herds. Each year a number of these cows are replaced because they have poor reproductive performance. It is from these animals that the experimental animals for this study are drawn. The criteria set up for cows to be used in this study are: (1) the cow must be open, (2) have a full mouth, (3) be free of gross evidence of clinical abnormality or disease, and (4) must have been bred at least four times since her last calf without apparent pregnancy, must have been with a bull continuously for six months without becoming pregnant, or must have failed to settle after two breeding seasons (three months each). Each animal used in the study was blood-tested for reproductive disease and the reproductive organs were examined by rectal palpation.

Checks for estrus were made twice daily and the condition of the reproductive tracts were followed by periodic rectal palpation. These cows were inseminated with high quality semen on the second estrus after entering the experiment, and if a failure to return to heat was noted, a pregnancy examination was made after 35 to 40 days. The cow was then slaughtered and the reproductive tract recovered for detailed examination. Cows which returned to estrus were rebred and slaughtered three to four days later. Their reproductive tracts were removed and examined for gross abnormalities and condition of the ova.

During the past year only four cows were available for this study. None of the four cows settled on the first service, and, therefore, they were slaughtered. No gross abnormalities were observed in the reproductive tract of these animals, and three of the four tracts contained fertilized ova. Of particular interest was the recovery of three ova from one cow, even though only one corpus luteum was present on her ovary. Of these three, one was a normal eight-cell ovum and the other two were classified as abnormal. The latter ova may have been the remains of ova from an earlier ovulation

V. FUTURE PLANS:

The project will continue as outlined.

VI. PUBLICATIONS:

None

VII. PUBLICATIONS PLANNED:

None

Submitted by : Bryan Baker, Jr.

I. PROJECT: Hatch 666 (S-10)

A Study to Determine the Breeding Worth of Inbred and Outbred Bulls from Various Sources

II. OBJECTIVES:

To compare pre- and post-weaning growth rates, market grades, carcass qualities, carcass grades, and maternal ability of the progenies of potentially superior sires selected from various sources.

III. PERSONNEL:

J. C. Taylor, L. F. Bowlin, and C. E. Lindley

IV. ACCOMPLISHMENTS DURING THE YEAR:

Weights and grades were collected at weaning on 139 Hereford calves from nine bull units and 70 Angus calves from four bull units. Average daily gains from birth to weaning, adjusted for sex and age of dam, and grades were as follows for each Hereford unit: Georgia Poll 692, 1.67 and 10.7; Rankin 839 (control), 1.58 and 11.0; Virginia Palmer 0187, 1.60 and 11.1; Colorado 8170, 1.61 and 10.7; Rankin 910, 1.56 and 11.0; Rankin 9011, 1.62 and 11.6; and Jones 038, 1.67 and 10.8. Gains and grades, respectively, for the Angus units were: Virginia 9249, 1.67 and 11.0; Virginia 0038, 1.75 and 11.7; and Oklahoma 436, 1.83 and 11.5. The 54 steers (29 Hereford, 15 Angus, and 10 Shorthorn) were grazed on oat-rye grass pasture from October 23, 1961, to December 8, 1961, and gained 0.83 pounds per day. The steers were then fed sorghum silage, ground ear corn, and cottonseed meal on native pasture until March 20, 1962, during which time they gained 1.33 pounds per day. During the drylot period, which ended June 18, 1962, the steers gained 2.18 pounds per day on a full-fed ration which contained 45 percent ground shelled corn, 22.5 percent ground oats, 22 percent cottonseed hulls, 9.5 percent cottonseed meal, and one percent salt and minerals plus Vitamin A. Over-all average daily gain was 1.55 for all steers from the time they were put on grass until they were slaughtered June 18. The steers averaged 804 pounds at slaughter and averaged grading 11.2 in the carcass. Other average carcass measurements were: dressing percent, 58.2; carcass length, 43.4 inches; length of leg, 27.3 inches; length of loin, 22.6 inches; circumference of round, 30.0 inches; width of round, 9.6 inches; rib-eye area, 9.6 square inches; fat covering at the 12th rib, 0.60 inches; marbling score, 8.0; tenderness score by a taste panel, 7.1; and shear value, 18.0.

V. FUTURE PLANS:

The testing of various lines and the collection of data on their progeny will be continued.

VI. PUBLICATIONS:

None

VII. PUBLICATIONS PLANNED:

A master's thesis which will be a study of the various observations that have been made on the carcasses of the tester steers is planned.

Submitted by: J. C. Taylor

FORM I
COW PRODUCTION, 1962 CALF CROP

Mississippi State

Location	Prairie	Prairie	Prairie	Prairie	Prairie	Prairie
Breed of sire	Angus	Angus	Angus	Angus	Hereford	Hereford
Breed of dam	Angus	Angus	Angus	Angus	Hereford	Hereford
Line or group[1]	Va. 9249	Va. 0038	Okla. 066	Okla. 436	Ga.Poll 692	Rankin 839
No. cows exposed[2]	15	14	31	28	37	28
No. calves born[3]	13	13	30	25	33	24
Calving percent, born	87	93	97	89	89	86
Av. birth date	3/18/62	3/13/62	3/06/62	3/05/62	3/11/62	3/13/62
Av. birth wt.	72	64	57	70	70	71
No. calves weaned	12	13	27	24	33	22
Calving percent, weaned[4]	80	93	87	86	89	78
Av. weaning age, days	232	233	240	241	235	233
Adj. ADG[5]	1.67	1.75	1.68	1.83	1.67	1.58
Av. type sc.[6]	11.0	11.7	11.1	11.5	10.7	11.0
Av. cond. sc.[6]						

1 - Purebreds, grade, line, backcross, three-breed cross, treatment, etc.
2 - Total number put in breeding herd
3 - Total number born, dead + alive
4 - Number weaned, divided by number of cows exposed
5 - Indicate adjustments:

Adjustments for sex of calf and age of dam are as follows:

Age of Dam	Steers	Heifers
2	1.20	1.29
3	1.10	1.19
4	1.06	1.14
5-10	1.00	1.08
11-13	1.05	1.13

6 - 15, 16, and 17 = Fancy
12, 13, and 14 = Choice
9, 10, and 11 = Good
6, 7, and 8 = Medium

FORM I
COW PRODUCTION, 1962 CALF CROP

Mississippi State

Location	Prairie	Prairie	Prairie	Prairie	Prairie	Prairie
Breed of sire	P. Heref.	Hereford	Hereford	Hereford	P. Heref.	P. Heref.
Breed of dam	Hereford	Hereford	Hereford	Hereford	Hereford	Hereford
Line or group[1]	Va. 0187	Colo. 8170	Rankin 910	Rankin 9011	Jones 038	Jones 051
No. cows exposed[2]	12	28	16	12	15	14
No. calves born[3]	9	23	15	12	14	11
Calving percent, born	75	82	94	100	93	78
Av. birth date	4/01/62	3/10/62	3/14/62	3/15/62	3/15/62	3/27/62
Av. birth wt.	69	72	72	71	72	75
No. calves weaned	9	20	14	12	14	10
Calving percent, weaned[4]	75	71	88	100	93	71
Av. weaning age, days	214	236	232	231	231	219
Adj. ADG[5]	1.60	1.61	1.56	1.62	1.67	1.62
Av. type sc.[6]	11.1	10.7	11.0	11.6	10.8	10.7
Av. cond. sc.[6]						

1 - Purebreds, grade, line, backcross, three-breed cross, treatment, etc.
2 - Total number put in breeding herd
3 - Total number born, dead + alive
4 - Number weaned, divided by number of cows exposed
5 - Indicate adjustments:
Adjustments for sex of calf and age of dam are as follows:

Age of dam	Steers	Heifers
2	1.20	1.29
3	1.10	1.19
4	1.06	1.14
5-10	1.00	1.08
11-13	1.05	1.13

6 - 15, 16, and 17 = Fancy
12, 13, and 14 = Choice
9, 10, and 11 = Good
6, 7, and 8 = Medium

FORM I
COW PRODUCTION, 1962 CALF CROP

Mississippi State

Location	Prairie					
Breed of sire	Hereford					
Breed of dam	Hereford					
Line or group[1]	Va. 0188					
No. cows exposed[2]	12					
No. calves born[3]	12					
Calving percent, born	100					
Av. birth date	3/09/62					
Av. birth wt.	74					
No. calves weaned	11					
Calving percent, weaned[4]	92					
Av. weaning age, days	237					
Adj. ADG[5]	1.55					
Av. type sc.[6]	10.8					
Av. cond. sc.[6]						

1 - Purebreds, grade, line, backcross, three-breed cross, treatment, etc.
2 - Total number put in breeding herd
3 - Total number born, dead + alive
4 - Number weaned, divided by number of cows exposed
5 - Indicate adjustments:

Adjustments for sex of calf and age of dam are as follows:

Age of dam	Steers	Heifers
2	1.20	1.29
3	1.10	1.19
4	1.06	1.14
5-10	1.00	1.08
11-13	1.05	1.13

6 - 15, 16, and 17 = Fancy
12, 13, and 14 = Choice
9, 10, and 11 = Good
6, 7, and 8 = Medium

FORM II
POSTWEANING PERFORMANCE OF CALVES FED IN 1962

Mississippi State

Location	Prairie	Prairie	Prairie	Prairie	Prairie	Prairie
Breed of sire	P. H.	Hereford	Hereford	Hereford	Hereford	Hereford
Breed of dam	Hereford	Hereford	Hereford	Hereford	Hereford	Hereford
Line or group[1]	Ga.P.692	N.Mex. 8	Mont. 481	Okla. 6-93	Popla. 116	Rankin 839
Bulls: No. in group						
Bulls: Av. init. age						
Bulls: Av. init. wt.						
Bulls: Av.no.da.fed						
Bulls: Av. final wt.						
Bulls: ADG on test						
Bulls: Av. type sc.						
Bulls: Av. cond. sc.						
Bulls: Av. inbreeding						
Heifers: No. in group						
Heifers: Feed regime[2]						
Heifers: Av. init. age						
Heifers: Av. init. wt.						
Heifers: Av.no.da.fed						
Heifers: Av. final wt.						
Heifers: ADG on test						
Heifers: Av. type sc.						
Heifers: Av. cond. sc.						
Heifers: Av. inbreeding						
Steers: No. in group	5	5	5	4	5	5
Steers: Feed regime[2]						
Steers: Av. init. age	246	247	223	235	235	222
Steers: Av. init. wt.	454	467	408	460	410	403
Steers: Av.no.da.fed	238	238	238	238	238	238
Steers: Av. final wt.	880	845	767	829	788	772
Steers: ADG on test	1.79	1.59	1.51	1.55	1.59	1.55
Steers: Av. type sc.	10.4	11.9	9.4	11.4	11.7	10.8
Steers: Av. cond. sc.	10.1	10.4	7.6	9.8	9.9	8.7
Steers: Av. inbreeding	0	0	0	0	0	0

1 - Show whether station-owned or cooperator owned, in addition to other group designation. (Both station-owned and cooperator-owned)

2 - Feed regime:	BULLS	HEIFERS	STEERS
How fed - full, limited, etc			
Pounds/day over feeding period			
Ration:			Winter grazed for first 46 days. Full feed of sorghum silage + 12 lbs. ground ear corn, 1-1/2 lbs. cottonseed meal, and 3 lbs. Johnsongrass hay on native pasture for 102 days; followed by a fattening ration in drylot for 90 days - 45% corn, 23% oats, 22% cottonseed hulls, and 10% cottonseed meal.

FORM II
POSTWEANING PERFORMANCE OF CALVES FED IN 1962

Mississippi State

Location	Prairie	Prairie	Prairie	Prairie	Prairie	
Breed of sire	Angus	Angus	Angus	Shorthorn	Shorthorn	
Breed of dam	Angus	Angus	Angus	Shorthorn	Shorthorn	
Line or group[1]	Okla.066	Equine 747	Cat. 7W6	Va. 1339	G'news 56-66	
Bulls: No. in group						
Bulls: Feed regime[2]						
Bulls: Av. init. age						
Bulls: Av. init. wt.						
Bulls: Av.no.da.fed						
Bulls: Av. final wt.						
Bulls: ADG on test						
Bulls: Av. type sc.						
Bulls: Av. cond. sc.						
Bulls: Av. inbreeding						
Heifers: No. in group						
Heifers: Feed regime[2]						
Heifers: Av. init. age						
Heifers: Av. init. wt.						
Heifers: Av.no.da.fed						
Heifers: Av. final wt.						
Heifers: ADG on test						
Heifers: Av. type sc.						
Heifers: Av. cond. sc.						
Heifers: Av. inbreeding						
Steers: No. in group	5	5	5	5	5	
Steers: Feed regime[2]						
Steers: Av. init. age	250	237	245	233	234	
Steers: Av. init. wt.	421	456	412	438	443	
Steers: Av.no.da.fed	238	238	238	238	238	
Steers: Av. final wt.	774	832	769	805	794	
Steers: ADG on test	1.49	1.58	1.50	1.54	1.47	
Steers: Av. type sc.	12.4	11.2	11.9	12.3	11.4	
Steers: Av. cond. sc.	11.3	11.6	11.1	11.6	10.4	
Steers: Av. inbreeding	0	0	0	0	0	

1 - Show whether station-owned or cooperator-owned, in addition to other group designation. (Station-owned and cooperator owned)

2 - Feed regime:

	BULLS	HEIFERS	STEERS
How fed - full, Limited, etc.			
Pounds/day over feeding period			
Ration:			Winter grazed for first 46 days. Full-feed of sorghum silage + 12 lbs. ground ear corn, 1-1/2 lbs. CSM, and 3 lbs. Johnsongrass hay on nativ pasture for 102 days; followed by a fattening ration in dry-lot for 90 days: 45% corn, 23% oats, 22% cottonseed hulls and 10% CSM.

FORM III
SLAUGHTER DATA, 1962

Mississippi State

Location	Prairie	Prairie	Prairie	Prairie	Prairie	Prairie
Breed of sire	P. Heref.	Hereford	Hereford	Hereford	Hereford	Hereford
Breed of dam	Hereford	Hereford	Hereford	Hereford	Hereford	Hereford
Line or group	Ga. 692	N. Mex. 8	Mont. 481	Okla.6-93	Popla.116	Rankin 839
Sex	Male	Male	Male	Male	Male	Male
Age at slaughter	484	485	461	473	473	460
No. slaughtered	5	5	5	4	5	5
Days in feedlot	238	238	238	238	238	238
Final feedlot wt.	880	845	767	829	788	772
Slaughter wt., live	880	845	765	829	788	772
Carcass wt., ~~cold~~ HOT	515	492	430	480	450	444
Dressing percent, ~~cold~~ HOT	58.4	58.2	56.0	57.9	57.1	57.6
Carcass grade, quality	11.6	10.4	9.2	11.0	10.8	9.8
Carcass grade, cutability						
Est. percent kidney fat						
Rib-eye area/100 lbs. carcass	1.99	2.10	2.18	2.16	2.17	2.06
Marbling score	8.4	9.4	9.6	8.2	9.2	9.0
Fat thickness over rib eye[1]	0.60	0.50	0.45	0.45	0.45	0.53
W-B shear force, pounds[2]	16.1	17.6	-	17.6	18.3	18.0

1 - Use one measure - if not, indicate method.
Average of three measurements

2 - Indicate size of core used and how meat was cooked.
One-inch core, meat was broiled

FORM III
SLAUGHTER DATA, 1962

Mississippi State

Location	Prairie	Prairie	Prairie	Prairie	Prairie	
Breed of sire	Angus	Angus	Angus	Shorthorn	Shorthorn	
Breed of dam	Angus	Angus	Angus	Shorthorn	Shorthorn	
Line or group	Okla.066	Equeen 747	Cat. 7W6	Va.Sh.1339	G'news 56-66	
Sex	Male	Male	Male	Male	Male	
Age at slaughter	488	475	483	471	472	
No. slaughtered	5	5	5	5	5	
Days in feedlot	238	238	238	238	238	
Final feedlot wt.	774	832	769	805	794	
Slaughter wt., live	774	832	769	805	794	
Carcass wt., cold	455	498	443	482	465	
Dressing percent, cold	58.6	59.9	57.7	59.9	58.5	
Carcass grade, quality	12.2	13.0	12.8	11.6	11.2	
Carcass grade, cutability						
Est. percent, kidney fat						
Rib-eye area/100 lbs. carcass	2.32	1.98	2.23	1.72	1.81	
Marbling score	7.0	6.6	6.8	7.8	8.0	
Fat thickness over rib eye[1]	0.66	0.64	0.72	0.81	0.71	
W-B shear force, pounds[2]	19.5	15.6	17.7	19.7	18.1	

1 - Use one measure - if not, indicate method.
Average of three measurements

2 - Indicate size of core used and how meat was cooked.
One-inch core, meat was broiled

NORTH CAROLINA STATE COLLEGE
Agricultural Experiment Station

I. PROJECT: Animal Science H-198, AH Line Project d1-23 (S-10)

Genetic and Environmental Interactions for Performance and Carcass Traits in Beef Cattle

II. OBJECTIVES:

To evaluate the importance of sire-by-location interactions for performance traits.

To evaluate sire-by-location and ration interaction for gain and carcass characteristics of steer progeny.

To develop and evaluate selection criteria for the improvement of productive efficiency and market quality.

III. PERSONNEL:

E. U. Dillard, J. H. Gregory, J. E. Legates, O. W. Robison, and J. R. Hill

IV. ACCOMPLISHMENTS DURING THE YEAR:

In 1962 a total of 247 cows were in the breeding herds at the four locations. Of this number, 244 were inseminated using artificial insemination and 187, or 76.6 percent of these, were determined by palpation to be pregnant. The following table indicates differences by herds in insemination results.

TABLE 1. A.I. Results, 1962 Breeding Season

	Raleigh	Plymouth	Laurel Spgs.	Butner	Totals
Cows to be bred	52	70	52	73	247
Inseminated	50	69	52	73	244
Diagnosed pregnant	35	55	39	58	187
Percent conception, (all cows)	67.3	78.6	75.0	79.5	75.7

As shown in Form III, 21 bull progeny of the three sires used in 1960 were slaughtered at 15-18 months of age. Weights ranged from 660 to 1000 pounds, with a mean weight of 882 pounds. Cooked steaks from four of the 21 animals were found to have undesirable flavors by two members of the taste panel. This was a great improvement over the year before, but it still is an item of concern. The next group of bulls slaughtered will be subjected to a rather detailed study in an effort to find a reason for these off-flavors.

Steers which were half-sibs to the previously discussed bulls were fed according to plan at three locations and were slaughtered in the fall of 1962 (see Form III). As expected, gains of steers on pasture alone were very much lower than those full-fed in the feed-lot. Gains by all steers on pasture were unsatisfactory, but location differences were also large. Practically all progeny (steers and heifers) at one location performed poorly as calves and yearlings. This seems to have been associated with a rather severe and complete disease situation which occurred when these calves were quite young.

The birth weights and 205-day weights of the 1962 calves were significantly higher for progeny of the performance and progeny tested sire of the Montana line 1. Table 2 gives a resume of the 1962 pre-weaning calf performance by herd and sire.

TABLE 2. Preweaning Performance, 1962 Calves

				Mid-Summer Information			Weaning Information			
Herd	Sire	No. Calves	Birth Wt.	Adj. ADG	Adj. 120 Day Wt.	Av. Type Sc.	Actual Wean. Wt.	Adj. ADG	Adj. 205 Day Wt.	Av. Type Sc.
Raleigh	0100	11	61	1.62	256	11	365	1.57	383	11
	6625	8	69	1.54	254	8	372	1.57	391	9
	8027	8	57	1.49	236	11	348	1.47	358	10
		27	63		249		362	1.54	379	10
Plymouth	0100	14	67	1.80	283	10	396	1.80	436	10
	6625	11	79	1.94	311	9	434	1.95	479	9
	8027	24	61	1.65	259	10	360	1.64	397	10
		49	67		277		387	1.76	428	10
Laurel Springs	0100	12	65	1.63	262	10	380	1.70	414	11
	6625	12	73	1.81	290	10	413	1.84	450	10
	8027	11	56	1.69	261	10	360	1.65	394	11
		35	65		271		385	1.73	420	10
Butner	0100	21	58	1.47	235	10	377	1.55	376	10
	6625	14	69	1.45	243	9	419	1.66	409	10
	8027	17	58	1.45	231	10	366	1.50	365	10
		52	61		236	10	385	1.56	381	10

For the second straight year, one of the herds achieved approximately 80 percent conception in a breeding season of less than 60 days. However, results in the other herds were less satisfactory. More attention to details such as heat detection and actual insemination procedures apparently is needed.

V. FUTURE PLANS:

No change in this project is planned. Analysis of three years of data is now in progress and leads from this may indicate modifications, but these are not anticipated.

VI. PUBLICATIONS:

Lehmann, R. P., J. E. Legates, O. W. Robison, J. H. Gregory, and E. U. Dillard. 1962. Preweaning growth patterns in beef calves. Journal of Animal Science, 21:974 (abstract).

VII. PUBLICATIONS PLANNED:

Evaluation of maternal influence on preweaning performance of calves.

Submitted by: E. U. Dillard

FORM I
COW PRODUCTION, 1962 CALF CROP

North Carolina State

Location	Raleigh	Plymouth	LaurelSpgs	Butner		
Breed of sire	Hereford	Hereford	Hereford	Hereford		
Breed of dam	Hereford	Hereford	Hereford	Hereford		
Line or group[1]	Purebred	Grade	Grade	Grade		
No. cows exposed[2]	51	64	54	66		
No. calves born[3]	31	42*	39	57		
Calving percent, born	61	62	68	81		
Av. birth date	2/11/62	2/16/62	2/16/62	1/15/62		
Av. birth wt.	62	68	65	61		
No. calves weaned	27	39	36	52		
Calving percent, weaned[4]	53	61*	67	79		
Av. weaning age, days	203	201	198	220		
Adj. ADG[5]	1.54	1.76	1.73	1.58		
Av. type sc.[6]	10.0	9.9	10.3	9.8		
Av. cond. sc.[6]						

1 - Purebreds, grade, line, backcross, three-breed cross, treatment, etc.
2 - Total number put in breeding herd
3 - Total number born, dead + alive
4 - Number weaned, divided by number of cows exposed
5 - Indicate adjustments

See Va. Bulletin 489, p. 26, season 1 only.

6 - 15, 16, and 17 = Fancy
12, 13, and 14 = Choice
9, 10, and 11 = Good
6, 7, and 8 = Medium

* Ten additional cows calved by natural service to clean up bull. Data on these are not included here.

FORM II
POSTWEANING PERFORMANCE OF CALVES FED IN 1962

North Carolina State

	Location	Raleigh	Plymouth	Laurel S.	Butner		
	Breed of sire	Hereford	Hereford	Hereford	Hereford		
	Breed of dam	Hereford	Hereford	Hereford	Hereford		
	Line or group[1]				Coop.		
Bulls	No. in group	22					
	Feed regime[2]						
	Av. init. age	253					
	Av. init. wt.	383					
	Av.no.da.fed	154					
	Av. final wt.	724					
	ADG on test	2.22					
	Av. type sc.	9.9					
	Av. cond. sc.	7.0					
	Av. inbreeding	Neg.					
Heifers	No. in group	HEIFERS FED FOR GROWTH ONLY					
	Feed regime[2]						
	Av. init. age						
	Av. init. wt.						
	Av.no.da.fed						
	Av. final wt.						
	ADG on test						
	Av. type sc.						
	Av. cond. sc.						
	Av. inbreeding						
Steers	No. in group		5	8	7		
	Feed regime[2]						
	Av. init. age		409	452	436		
	Av. init. wt.		438	577	553		
	Av.no.da.fed		196	169	199		
	Av. final wt.		795	925	951		
	ADG on test		1.83	2.06	2.00		
	Av. type sc.		9.2	11.5	10.7		
	Av. cond. sc.		8.4	10.1	10.4		
	Av. inbreeding		Neg.	Neg.	0		

1 - Show whether station-owned or cooperator-owned, in addition to other group designation.

2 - Feed regime:	BULLS	HEIFERS	STEERS
How fed - full, limited, etc.	Full-fed		Limited, then full
Pounds/day over feeding period	+0.6 lbs. grass hay 16.9 lbs./head/day		
Ration:	1275 lbs. gr. sn. corn 400 lbs. gr. corn cobs 100 lbs. dehy. alfalfa meal 200 lbs. soybean oil meal 12 lbs. deflourinated phosphate 6 lbs. gr. limestone 7 lbs. trace mineralized salt		80% - gr. sh. corn 20% soybean oil meal grass hay

FORM III
SLAUGHTER DATA, 1962

North Carolina State

Location	Raleigh	Plymouth*	Plymouth*	Laurel S.	Laurel S.	Butner
Breed of sire	Hereford	Hereford	Hereford	Hereford	Hereford	Hereford
Breed of dam	Hereford	Hereford	Hereford	Hereford	Hereford	Hereford
Line or group						
Sex	Bulls	Steers	Steers	Steers	Steers	Steers
Age at slaughter	483	605	592	621	622	635
No. slaughtered	21	5	4	8	8	7
Days in feedlot	233	196	Pasture only	169	Pasture only	199
Final feedlot wt.	882	775	620	925	811	951
Slaughter wt., live	859	740	580	901	781	916
Carcass wt., cold	504	421	305	539	436	539
Dressing percent, cold	58.7	56.4	52.4	59.8	55.7	58.7
Carcass grade, quality	**	9.0	6.5	11.0	7.9	10.1
Carcass grade, cutability						
Est. percent kidney fat						
Rib-eye area/100 lbs. carcass	2.22	1.94	2.39	1.84	2.31	1.68
Marbling score	9.6	10.6	7.5	14.7	8.4	12.4
Fat thickness over rib eye[1]	9.96cm.	15.80cm.	6.00cm.	18.96cm.	6.98cm.	20.17cm
W-B shear force, pounds[2]	13.49	----NOT YET AVAILABLE----------				

1 - Use one measure - if not, indicate method.
Average of three distances drawn perpendicular to outside surface of fat and connecting to three lines measured perpendicular to points equidistant on a line drawn through longest part of rib eye.

2 - Indicate size of core used and how meat was cooked.
3/4-inch core. Two steaks cooked (broiled) to an internal temperature of 160° F.

* Practically all Plymouth calves were sick as baby calves and seemed never to recover. Only a very few calves appeared to grow normally.

** 6 - Good, 14 - Commercial, and 1 - Utility.

FORM III
SLAUGHTER DATA, 1962

North Carolina State

Location	Butner					
Breed of sire	Hereford					
Breed of dam	Hereford					
Line or group						
Sex	Steers					
Age at slaughter	628					
No. slaughtered	7					
Days in feedlot	Pasture only					
Final feedlot wt.	808					
Slaughter wt., live	739					
Carcass wt., cold	409					
Dressing percent, cold	55.3					
Carcass grade, quality	7.7					
Carcass grade, cutability						
Est. percent, kidney fat						
Rib-eye area/100 lbs. carcass	2.13					
Marbling score	8.4					
Fat thickness over rib eye[1]	9.62cm.					
W-B shear force, pounds[2]	Not yet available					

1 - Use one measure - if not, indicate method

2 - Indicate size of core used and how meat was cooked.

CLEMSON COLLEGE
Agricultural Experiment Station

I. PROJECT: SC 479 (S-10)

The Response of Sire Progenies to Management and Feeding Procedures

II. OBJECTIVES:

To investigate the response of sire progenies, as measured by live animal and carcass traits, to methods of producing slaughter cattle.

To evaluate the magnitude and importance of the average genotype with certain environmental influences.

To develop through selection herds of beef cattle with superior performance under South Carolina conditions.

III. PERSONNEL:

W. C. Godley, H. H. Pierce, G. C. Skelley, Mary J. Marbut, R. M. Rauton, R. R. Ritchie, and J. H. Mitchell, Jr.

IV. ACCOMPLISHMENTS DURING THE YEAR:

The breeding herd which produced the 1962 calf crop was composed of 77 purebred Polled Hereford cows and 119 purebred Angus cows. The 54 Hereford calves which were weaned were the progeny of four bulls, and the 84 Angus calves were sired by five bulls. As one Angus bull was injured during the breeding season, a replacement was used during the latter part of the season. One Hereford bull was eliminated due to the performance of his offspring, and his replacement was obtained from an out-of-state breeder.

All cows were checked for pregnancy in September 1961. Cows which were open were examined, both ante-mortem and post-mortem, by qualified veterinarians. Cervical and/or vaginal smears were obtained where possible, and laboratory tests were made to determine why these cows did not conceive. Some of the open cows were culled as a result of poor reproductive performance.

In selecting the cows that made up the breeding herds, emphasis was placed on their production records. Two-year old heifers being bred for the first time were selected on the basis of their lifetime records.

Twelve bull calves, representing three Angus and two Hereford sires were selected as possible herd sires and were fed on a 140-day ROP feeding trial. Of the remaining calves, 21 Angus steers, 20 Hereford steers, and 18 Angus heifers were fed on post-weaning feeding tests. The steers were slaughtered and detailed carcass data was obtained.

V. FUTURE PLANS:

Present plans are to follow the project as outlined. Relocation of research units at Clemson is near completion and facilities for beef cattle research are being improved. A beef cattle feeding barn is presently under construction.

VI. PUBLICATIONS:

None

VII. PUBLICATIONS PLANNED:

A major effort will be made during the next year to analyze all available data. Publication of the results is anticipated.

Submitted by: W. C. Godley

FORM I
COW PRODUCTION, 1962 CALF CROP

South Carolina State

Location	Clemson	Clemson	Clemson	Clemson		
Breed of sire	Angus	Angus	Hereford	Hereford		
Breed of dam	Angus	Angus	Hereford	Hereford		
Line or group[1]	CBB 2	CA	SR-SFR	Ch. Ad.		
No. cows exposed[2]	30	30	20	22		
No. calves born[3]	27*	26**	13***	17****		
Calving percent, born	90.0	86.7	65.0	77.2		
Av. birth date	1/31/62	2/06/62	2/10/62	2/02/62		
Av. birth wt.	60.8	62.6	64.3	69.9		
No. calves weaned	26	19	11	16		
Calving percent, weaned[4]	86.7	63.3	55.0	72.7		
Av. weaning age, days	208.9	207.9	206.0	207.6		
Adj. ADG[5]	1.93	2.06	1.62	1.76		
Av. type sc.[6]	12.2	11.3	9.8	10.6		
Av. cond. sc.[6]						

1 - Purebreds, grade, line, backcross, three-breed cross, treatment, etc.
2 - Total number put in breeding herd
3 - Total number born, dead + alive
4 - Number weaned, divided by number of cows exposed
5 - Indicate adjustments:

Gain adjusted for age of dam, sex of calf, and creep feeding.

6 - 15, 16, and 17 = Fancy
12, 13, and 14 = Choice
9, 10, and 11 = Good
6, 7, and 8 = Medium

* One cow exposed was sold before calving - on pregnancy check, she was open.
** Two cows exposed were sold before calving - on pregnancy check, both were open.
*** Three cows exposed were sold before calving - on pregnancy check, two were pregnant and one was open.
**** Two cows exposed were sold before calving - on pregnancy check, both were pregnant.

FORM I
COW PRODUCTION, 1962 CALF CROP

South Carolina State

Location	Summerville	Summerville	Summerville	Summerville	Summerville	
Breed of sire	Angus	Angus	Angus	Hereford	Hereford	
Breed of dam	Angus	Angus	Angus	Hereford	Hereford	
Line or group[1]	G-34	BI 4709*	Boguemere 1047*	V.D.	GM	
No. cows exposed[2]	29**	22***	8	18	17	
No. calves born[3]	24	13	8	16	17	
Calving percent, born	82.8	59.1	100.0	88.9	100.0	
Av. birth date	2/02/62	2/06/62	3/05/62	1/27/62	2/07/62	
Av. birth wt.	69.5	64.4	71.1	66.0	67.0	
No. calves weaned	22	9	8	14	13	
Calving percent, weaned[4]	75.9	40.9	100.0	77.8	76.5	
Av. weaning age, days	207.0	214.6	209.0	213.1	207.9	
Adj. ADG[5]	1.80	1.75	1.77	1.77	1.57	
Av. type sc.[6]	11.5	11.4	10.3	10.6	9.7	
Av. cond. sc.[6]						

1 - Purebreds, grade, line, backcross, three-breed cross, treatment, etc.
2 - Total number put in breeding herd
3 - Total number born, dead + alive
4 - Number weaned, divided by number of cows exposed
5 - Indicate adjustments:

6 - 15, 16, and 17 = Fancy
12, 13, and 14 = Choice
9, 10, and 11 = Good
6, 7, and 8 = Medium

* BI 4709 was injured and removed from the herd during breeding season. Boguemere 1047 replaced him.
* Two cows exposed were sold before calving - on pregnancy check, both were open.
** Two cows exposed were sold before calving - on pregnancy check, both were open.

FORM II
POSTWEANING PERFORMANCE OF CALVES FED IN 1962

South Carolina State

Location	Clemson	Clemson	Clemson	Clemson	Clemson	Clemson
Breed of sire	Hereford	Hereford	Hereford	Hereford	Hereford	Hereford
Breed of dam	Hereford	Hereford	Hereford	Hereford	Hereford	Hereford
Line or group[1]	Sauer	V. D.	G. M.	Ch. Ad.	CPH Cl'tone	SFR S.R.
Bulls: No. in group		1	3	2		
Feed regime[2]						
Av. init. age		231	217	227		
Av. init. wt.		470.0	470.0	542.5		
Av.no.da.fed		140	140	140		
Av. final wt.		740.0	778.3	865.0		
ADG on test		1.93	2.20	2.31		
Av. type sc.		11.5	10.0	11.4		
Av. cond. sc.						
Av. inbreeding		0	0	0		
Heifers: No. in group						
Feed regime[2]						
Av. init. age						
Av. init. wt.						
Av.no.da.fed						
Av. final wt.						
ADG on test						
Av. type sc.						
Av. cond. sc.						
Av. inbreeding						
Steers: No. in group	6	1	3	3	6	1
Feed regime[2]						
Av. init. age	243.1	223.0	282.6	247.7	239.0	258.0
Av. init. wt.	450.0	515.0	481.7	463.3	403.3	415.0
Av.no.da.fed	186.7	168.0	168.0	219.3	179.7	140.0
Av. final wt.	788.0	902.0	799.7	841.7	731.2	690.0
ADG on test	1.85	2.30	1.94	1.77	1.86	1.96
Av. type sc.						
Av. cond. sc.	10.8	11.3	10.7	10.9	10.3	10.3
Av. inbreeding	0	0	0	0	0	0

1 - Show whether station-owned or cooperator-owned, in addition to other group designation

2 - Feed regime:

	BULLS	HEIFERS	STEERS
How fed - full, limited, etc.	Full		
Pounds/day over feeding period			
Ration:	400 lbs. crimped oats 200 lbs. alfalfa pellets 450 lbs. cottonseed hulls 200 lbs. wheat bran 100 lbs. 32% supplement 90 lbs. blackstrap molasses 400 lbs. cr. corn	Steers within sire groups were randomly assigned, where possible, to: (1) dry lot + Coastal Bermuda hay or pellets, (2) fescue pasture + full or limited ration of shelled corn, or (3) ryegrass-Crimson clover pasture + full or limited ration of shelled corn.	

FORM II
POSTWEANING PERFORMANCE OF CALVES FED IN 1962

South Carolina State

	Location	Clemson	Clemson	Clemson	Clemson	Clemson	
	Breed of sire	Angus	Angus	Angus	Angus	Angus	
	Breed of dam	Angus	Angus	Angus	Angus	Angus	
	Line or group [1]	CBB 2	CA	G-34	BI 4709	G-14	
Bulls	No. in group	2	2	3	5		
	Feed regime[2]						
	Av. init. age	227.0	225.5	233.0	231.0		
	Av. init. wt.	425.0	497.5	538.0	526.0		
	Av.no.da.fed	140.0	140.0	140.0	140.0		
	Av. final wt.	712.5	817.5	845.0	773.0		
	ADG on test	2.06	2.29	2.19	1.76		
	Av. type sc.	11.2	9.9	12.2	10.9		
	Av. cond. sc.						
	Av. inbreeding	0	0	0	0		
Heifers	No. in group			11	7		
	Feed regime[2]						
	Av. init. age			262.5	272.4		
	Av. init. wt.			526.8	497.9		
	Av.no.da.fed			190.9	164.0		
	Av. final wt.			819.8	777.9		
	ADG on test			1.58	1.71		
	Av. type sc.						
	Av. cond. sc.			11.7	12.1		
	Av. inbreeding			0	0		
Steers	No. in group	2	7	6	5	1	
	Feed regime[2]						
	Av. init. age	230.5	246.6	243.8	247.8	235.0	
	Av. init. wt.	410.0	507.1	517.5	528.0	425.0	
	Av.no.da.fed	182.0	188.0	205.3	187.6	238.0	
	Av. final wt.	805.0	848.0	836.7	799.8	820.0	
	ADG on test	2.17	1.85	1.60	1.53	1.66	
	Av. type sc.						
	Av. cond. sc.	12.3	11.8	11.7	10.9	11.7	
	Av. inbreeding	0	0	0	0	0	

1 - Show whether station-owned or cooperator-owned, in addition to other group designation.

2 - Feed regime:	BULLS	HEIFERS	STEERS
How fed - full, limited, etc.	Full		
Pounds/day over feeding period			
Ration:	400 lbs. crimped oats 200 lbs. alfalfa pellets 450 lbs. cottonseed hulls 200 lbs. wheat bran 100 lbs. 32% supplement 90 lbs. blackstrap molasses 400 lbs. cr. corn	Heifers and steers within sire groups were randomly assigned, where possible, to: (1) dry lot + Coastal Bermuda hay or pellets, (2) fescue pasture + full or limited ration of shell corn, or (3) ryegrass-Crimson clover pasture plus full or limited ration of shelled corn.	

FORM III
SLAUGHTER DATA, 1962

South Carolina State

Location	Clemson	Clemson	Clemson	Clemson	Clemson	
Breed of sire	Angus	Angus	Angus	Angus	Angus	
Breed of dam	Angus	Angus	Angus	Angus	Angus	
Line or group	CBB 2	CA	G-34	BI 4709	G-14	
Sex	Steers	Steers	Steers	Steers	Steers	
Age at slaughter	421.5	443.6	447.7	444.4	484.0	
No. slaughtered	2	7	6	5	1	
Days in feedlot	182.0	188.0	205.3	187.6	238.0	
Final feedlot wt.	805.0	848.0	836.7	799.8	820.0	
Slaughter wt., live	782.5	825.0	830.0	777.0	800.0	
Carcass wt., cold	467.6	465.0	482.7	450.3	448.1	
Dressing percent, cold	59.76	56.36	58.16	57.95	56.02	
Carcass grade, quality	12.5	11.6	11.7	11.8	12.0	
Carcass grade, cutability	3.5	2.8	3.1	3.0	3.0	
Est. percent kidney fat						
Rib-eye area/100 lbs. carcass	11.55	10.59	10.67	10.42	10.99	
Marbling score						
Fat thickness over rib eye[1]	0.91	0.70	0.83	0.63	0.66	
W-B shear force, pounds[2]	13.4	14.8	13.4	14.3	8.8	

1 - Use one measure - if not, indicate method.

2 - Indicate size of core used and how meat was cooked.
One-inch core, steaks broiled

FORM III
SLAUGHTER DATA, 1962

South Carolina State

Location	Clemson	Clemson	Clemson	Clemson	Clemson	Clemson
Breed of sire	Hereford	Hereford	Hereford	Hereford	Hereford	Hereford
Breed of dam	Hereford	Hereford	Hereford	Hereford	Hereford	Hereford
Line or group	Sauer	V. D.	GM	Ch. Ad.	CPH Cl'tone	SFR S. R.
Sex	Steers	Steers	Steers	Steers	Steers	Steers
Age at slaughter	438.8	414.0	459.7	476.0	427.7	407.0
No. slaughtered	6	1	3	3	6	1
Days in feedlot	186.7	182.0	168.0	219.3	179.7	140.0
Final feedlot wt.	788.0	902.0	799.7	841.7	731.2	690.0
Slaughter wt., live	762.5	880.0	783.3	818.3	702.5	645.0
Carcass wt., cold	445.2	534.5	460.1	470.1	403.4	388.0
Dressing percent, cold	58.39	60.74	58.74	57.45	57.42	60.16
Carcass grade, quality	10.3	11.0	11.7	11.0	10.0	11.0
Carcass grade, cutability	3.4	4.4	3.6	3.1	2.7	-
Est. percent kidney fat						
Rib-eye area/100 lbs. carcass	9.26	10.69	10.43	10.30	9.48	9.14
Marbling score						
Fat thickness over rib eye[1]	0.57	0.94	0.66	0.53	0.51	0.44
W-B shear force, pounds[2]	13.7	19.9	15.7	13.7	14.7	15.1

1 - Use one measure - if not, indicate method.

2 - Indicate size of core used and how meat was cooked.
One-inch core, steaks broiled

UNIVERSITY OF TENNESSEE
Agricultural Experiment Station

I. PROJECT: Hatch 61, AH Line Project d1-9 (S-10)

The Improvement of the Producing Ability of Beef Cattle

II. OBJECTIVES:

To develop lines, line crosses, or combinations of lines and crosses of beef cattle which will make the most efficient use of Tennessee pastures and forages and which will result in an improvement of such characters as rate of gain, economy of gain, carcass quality, fertility, and longevity.

To develop effective breeding techniques for the improvement of existing lines of beef cattle.

To investigate the effect of different levels of nutrition on the development of type and conformation, economy of gain, fertility, and longevity.

III. PERSONNEL:

C. S. Hobbs, R. J. Cooper, J. W. Cole, C. B. Ramsey, J. B. McLaren, R. A. Reynolds, B. B. Wilson, J. H. Felts, J. A. Odom, B. L. Whittenburg, and L. Safley.

IV. ACCOMPLISHMENTS DURING THE YEAR:

Performance records from birth to weaning were collected on about 805 calves. These data include performance records on progeny of 27 Hereford sires at six locations and 21 Angus sires at four locations to obtain basic data on mature size and variation in condition at different locations and between years.

Cows which were irradiated in 1961, in connection with the UT-AEC project to evaluate the effect of irradiation on lifetime performance, calved in 1962. Performance records from birth to weaning and in the feed-lot were collected on these calves. No significant differences were observed between the various levels of radiation (0, 200r, 300r, 400r, and 600r in two 300r exposure doses). Carcass data will be obtained on 42 steers and 24 heifers from this group of calves.

Thirty-nine Angus and Hereford bull calves from various stations were used to compare two methods of developing herd bulls from weaning age to approximately 20 months of age. Sixty Angus bull calves were selected at one location to feed from weaning to approximately 20 months of age to obtain performance data on individuals and sire progenies.

Carcass data were obtained on 55 yearling Hereford steers by eight sires, 60 yearling heifers by seven sires, three Angus steers by one sire, and two Angus Heifers by one sire. Two locations are represented in this study. Detailed carcass data have been obtained on eight steer progeny from four sires in cooperation with the Types and Breeds project.

Two experimental herds and a control herd were set up at each of two locations to compare a breeding program in which sire replacements are selected from within the herd to a program where sire replacements are selected from outside the herd. The same breeding plans and selection criteria will be maintained for each group. The control group will provide the basis of measurement of the effect of each program. A closed inbred herd is being continued at one of the above locations.

In the cooperative program with the extension service, individual calf records have been processed on 2697 calves, and summaries by sire, progeny, and herds have been made for 96 breeders.

V. FUTURE PLANS:

Present work on getting all sire and dam progeny data listed at approximately 120-140 days and at weaning time will continue. Weights and condition grades will be obtained on cows at about weaning time (November 1) and, in certain herds, on January 1 and July 1.

Studies on present and new methods of breeding systems and developing lines will continue at different stations.

The carcass evaluation and consumer acceptance phases will be expanded.

Additional use will be made of the IBM system for more detailed analysis and studies.

VI. PUBLICATIONS:

Cole, J. W., C. B. Ramsey, and R. H. Epley. 1962. Simplified methods for predicting pounds of lean in beef carcasses. Journal of Animal Science, 21:355.

Cole, J. W., C. B. Ramsey, and A. R. Cavender. 1962. Effect of weight, grade, and sex of beef carcasses on yield of packaged beef for the freezer. Tennessee Agricultural Experiment Station Bulletin 345.

Hupp, E. W., J. W. Austin, N. R. Parish, and R. L. Murphree. 1962. Sperm production of Hereford bulls at different intensities of collection. Journal of Animal Science, 21:272.

Parish, N. R., R. L. Murphree, and E. W. Hupp. 1962. Growth and sexual development of prenatally irradiated cattle. Journal of Animal Science, 21:473.

Ramsey, C. B., J. W. Cole, and C. S. Hobbs. 1962. Relation of beef carcass grades, proposed yield grades, and fat thickness to separable lean, fat, and bone. Journal of Animal Science, 21:193.

VII. PUBLICATIONS PLANNED:

None

Submitted by: C. S. Hobbs

FORM I
COW PRODUCTION, 1962 CALF CROP

Tennessee State

Location	Knoxville	Knoxville	Knoxville	Alcoa	Alcoa	Alcoa
Breed of sire	Hereford	Hereford	Angus	Hereford	Hereford	Hereford
Breed of dam	Hereford	Hereford	Angus	Hereford	Hereford	Hereford
Line or group[1]	9529	9605	9163	9505	2020	9609
No. cows exposed[2]	7	8	34	29	19	18
No. calves born[3]	7	7	32	29	19	17
Calving percent, born	100	88	94	100	100	94
Av. birth date	2/06/62	3/17/62	2/20/62	2/27/62	2/09/62	2/10/62
Av. birth wt.	64	57	65	71	71	79
No. calves weaned	4	5	22	25	13	13
Calving percent, weaned[4]	*	*	*	*	*	*
Av. weaning age, days	256	218	248	247	273	270
Adj. ADG[5]	1.76	1.75	1.87	1.76	1.77	1.81
Av. type sc.[6]	11.9	11.2	12.3	12.2	12.2	12.0
Av. cond. sc.[6]	8.0	8.0	8.8	8.6	9.2	8.8

1 - Purebreds, grade, line, back-cross, three-breed cross, treatment, etc.
2 - Total number put in breeding herd
3 - Total number born, dead + alive
4 - Number weaned, divided by number of cows exposed
5 - Indicate adjustments:

6 - 15, 16, and 17 = Fancy
12, 13, and 14 = Choice
9, 10, and 11 = Good
6, 7, and 8 = Medium

* Calves older than 300 days when weighed, sick calves, calves raised by a foster dam, and calves sold before weaning were not included.

FORM I
COW PRODUCTION, 1962 CALF CROP

Tennessee State

Location	Alcoa	Alcoa	Alcoa	Alcoa	Alcoa	Alcoa
Breed of sire	Hereford	Hereford	Hereford	Hereford	Hereford	Angus
Breed of dam	Hereford	Hereford	Hereford	Hereford	Hereford	Angus
Line or group[1]	2037	9618	9095	9605	9490	9709
No. cows exposed[2]	26*	22	15	6	4	13
No. calves born[3]	24	20	15	5	4	10
Calving percent, born	92	91	100	83	100	77
Av. birth date	2/28/62	2/23/62	2/20/62	2/24/62	2/21/62	2/27/62
Av. birth wt.	73	79	69	56	76	67
No. calves weaned	20	15	12	3	3	10
Calving percent, weaned[4]	**	**	**	**	**	77
Av. weaning age, days	249	256	262	260	265	253
Adj. ADG[5]	1.70	1.75	1.78	1.56	1.78	1.87
Av. type sc.[6]	11.6	11.6	12.2	10.7	10.5	12.2
Av. cond. sc.[6]	8.3	8.5	8.9	7.7	8.5	9.8

1 - Purebreds, grade, line, backcross, three-breed cross, treatment, etc.
2 - Total number put in breeding herd
3 - Total number born, dead + alive
4 - Number weaned, divided by number of cows exposed
5 - Indicate adjustments:

6 - 15, 16, and 17 = Fancy
12, 13, and 14 = Choice
9, 10, and 11 = Good
6, 7, and 8 = Medium

* One cow aborted 10/09/61, not included.
** Calves older than 300 days when weighed, sick calves, calves raised by a foster dam, and calves sold before weaning were not included.

FORM I
COW PRODUCTION, 1962 CALF CROP

Tennessee State

Location	Alcoa	Alcoa	Alcoa	Alcoa		
Breed of sire	Angus	Hereford	Hereford	Hereford		
Breed of dam	Angus	Hereford	Hereford	Hereford		
Line or group[1]	9163	9609	2020	9484		
No. cows exposed[2]	23	24	22	22		
No. calves born[3]	10	20	17	17		
Calving percent, born	43	83	77	77		
Av. birth date	9/29/61	10/07/61	10/14/61	10/10/61		
Av. birth wt.	65	74	71	66		
No. calves weaned	10	19	17	14		
Calving percent, weaned[4]	43	83	77	*		
Av. weaning age, days	156	148	141	144		
Adj. ADG[5]	1.50	1.55	1.64	1.53		
Av. type sc.[6]	12.2	12.0	12.1	11.9		
Av. cond. sc.[6]						

1 - Purebreds, grade, line, backcross, three-breed cross, treatment, etc.
2 - Total number put in breeding herd
3 - Total number born, dead + alive
4 - Number weaned, divided by number of cows exposed
5 - Indicate adjustments:

6 - 15, 16, and 17 = Fancy
12, 13, and 14 = Choice
9, 10, and 11 = Good
6, 7, and 8 = Medium

* Calves older than 300 days when weighed, sick calves, calves raised by a foster dam, and calves sold before weaning were not included.

FORM I
COW PRODUCTION, 1962 CALF CROP

Tennessee State

Location	Oak Ridge	Oak Ridge	Oak Ridge	Oak Ridge	Oak Ridge	Oak Ridge
Breed of sire	Hereford	Hereford	Hereford	Hereford	Hereford	Hereford
Breed of dam	Hereford	Hereford	Hereford	Hereford	Hereford	Hereford
Line or group[1]	9605	2037	9513	2196	6079	3262
No. cows exposed[2]	20	20	28	27	27	19
No. calves born[3]	19	18	27	25	25	8*
Calving percent, born	95	90	96	93	93	42
Av. birth date	5/10/62	5/08/62	2/13/62	2/08/62	2/18/62	1/28/62
Av. birth wt.	67	75	65	67	67	66
No. calves weaned	16	17	24	24	21	7
Calving percent, weaned[4]	**	85	86	89	78	**
Av. weaning age, days	217	220	242	246	235	258
Adj. ADG[5]	1.94	1.96	1.62	1.66	1.60	1.81
Av. type sc.[6]	12.1	11.7	11.9	11.6	11.6	12.9
Av. cond. sc.[6]	7.7	7.5	8.5	8.4	8.2	10.4

1 - Purebreds, grade, line, backcross, three-breed cross, treatment, etc.
2 - Total number put in breeding herd
3 - Total number born, dead + alive
4 - Number weaned, divided by number of cows exposed
5 - Indicate adjustments:

6 - 15, 16, and 17 = Fancy
12, 13, and 14 = Choice
9, 10, and 11 = Good
6, 7, and 8 = Medium

* Twins
** Calves older than 300 days when weighed, sick calves, calves raised by a foster dam, and calves sold before weaning were not included.

FORM I
COW PRODUCTION, 1962 CALF CROP

Tennessee State

Location	Oak Ridge	Oak Ridge	Oak Ridge	Greeneville	Greeneville	Greeneville
Breed of sire	Hereford	Hereford	Hereford	P.Hereford	P.Hereford	P.Hereford
Breed of dam	Hereford	Hereford	Hereford	P.Hereford	P.Hereford	P.Hereford
Line or group[1]	9034	9755	3224	4099	9868	4279
No. cows exposed[2]	27	15	19	22	27	19
No. calves born[3]	26*	15*	16	20*	27	17
Calving percent, born	96	100	84	91	100	89
Av. birth date	2/13/62	2/12/62	3/05/62	2/08/62	2/05/62	2/17/62
Av. birth wt.	64	72	75	74	77	71
No. calves weaned	22	13	14	14	21	12
Calving percent, weaned[4]	**	**	**	**	**	**
Av. weaning age, days	240	228	218	232	240	228
Adj. ADG[5]	1.70	1.91	1.90	1.70	1.96	1.93
Av. type sc.[6]	11.8	11.5	12.6	11.6	12.4	11.2
Av. cond. sc.[6]	8.8	8.9	9.6	8.9	9.2	9.0

1 - Purebreds, grade, line, backcross, three-breed cross, treatment, etc.
2 - Total number put in breeding herd
3 - Total number born, dead + alive
4 - Number weaned, divided by number of cows exposed
5 - Indicate adjustments:

6 - 15, 16, and 17 = Fancy
12, 13, and 14 = Choice
9, 10, and 11 = Good
6, 7, and 8 = Medium

* Twins
** Calves older than 300 days when weighed, sick cows, calves raised by a foster dam, and calves sold before weaning were not included.

FORM I
COW PRODUCTION, 1962 CALF CROP

Tennessee State

Location	Springfield	Springfield	Columbia	Columbia	Crossville	Crossville
Breed of sire	Hereford	Hereford	Hereford	Hereford	Angus	Angus
Breed of dam	Hereford	Hereford	Hereford	Hereford	Angus	Angus
Line or group[1]	9484	2215	9075	2085	5448	5429
No. cows exposed[2]	23	24	34	30	28	26
No. calves born[3]	19	20	33	29	25	20
Calving percent, born	83	83	97	97	89	77
Av. birth date	2/19/62	2/20/62	2/07/62	2/09/62	2/15/62	2/26/62
Av. birth wt.	65	70	68	70	61	57
No. calves weaned	18	18	25	27	20	13
Calving percent, weaned[4]	78	*	*	*	*	*
Av. weaning age, days	211	220	228	224	246	227
Adj. ADG[5]	1.68	1.71	1.70	1.70	1.87	1.82
Av. type sc.[6]	12.2	12.4	11.8	11.4	11.6	11.6
Av. cond. sc.[6]	9.6	9.2	8.8	8.6	9.5	9.3

1 - Purebreds, grade, line, backcross, three-breed cross, treatment, etc.
2 - Total number put in breeding herd
3 - Total number born, dead + alive
4 - Number weaned, divided by number of cows exposed
5 - Indicate adjustments:

6 - 15, 16, and 17 = Fancy
12, 13, and 14 = Choice
9, 10, and 11 = Good
6, 7, and 8 = Medium

* Calves older than 300 days when weighed, sick calves, calves raised by a foster dam, and calves sold before weaning were not included.

FORM I
COW PRODUCTION, 1962 CALF CROP

Tennessee State

Location	Crossville	Crossville	Crossville	Crossville	Crossville	
Breed of sire	Angus	Angus	Angus	Angus	Angus	
Breed of dam	Angus	Angus	Angus	Angus	Angus	
Line or group[1]	9309	5244	1249	9209	5207	
No. cows exposed[2]	23	16	23	26	26	
No. calves born[3]	20	14	20	22	24	
Calving percent, born	87	88	87	85	92	
Av. birth date	3/11/62	3/09/62	3/04/62	2/26/62	3/11/62	
Av. birth wt.	52	55	59	56	58	
No. calves weaned	16	14	16	19	17	
Calving percent, weaned[4]	*	88	*	*	*	
Av. weaning age, days	235	234	238	246	230	
Adj. ADG[5]	1.86	1.20	1.81	1.80	1.79	
Av. type sc.[6]	12.1	12.0	11.8	13.4	11.5	
Av. cond. sc.[6]	9.4	10.0	9.7	9.7	9.3	

1 - Purebreds, grade, line, backcross, three-breed cross, treatment, etc.
2 - Total number put in breeding herd
3 - Total number born, dead + alive
4 - Number weaned, divided by number of cows exposed
5 - Indicate adjustments:

6 - 15, 16, and 17 = Fancy
12, 13, and 14 = Choice
9, 10, and 11 = Good
6, 7, and 8 = Medium

* Calves older than 300 days when weighed, sick calves, calves raised by a foster dam, and calves sold before weaning were not included.

FORM II
SLAUGHTER DATA, 1962

Tennessee State

Location	Greeneville	Greeneville	Alcoa	Alcoa	Alcoa	Alcoa
Breed of sire	Hereford	Hereford	Hereford	H x A	Hereford	Hereford
Breed of dam	Hereford	Hereford	Hereford	H x A	Hereford	Hereford
Line or group						
Sex	Females	Steers	Steers	Steers	Steers	Females
Age at slaughter	451	654	543	562	620	574
No. slaughtered	13	9	15	32	16	66
Days in feedlot	90	84	25	51	110	58
Final feedlot wt.	726	1040	994	984	1091	858
Slaughter wt., live	708	1026	969	961	1068	815
Carcass wt., cold	411	602	569	560	632	472
Dressing percent, cold	58	59	59	58	59	58
Carcass grade, quality	10.4	10.1	9.3	8.8	11.1	9.5
Carcass grade, cutability						
Est. percent, kidney fat			3.5		2.8	3.3
Rib-eye area/100 lbs. carcass			10.70	10.75	10.81	9.57
Marbling score			3.8	2.6	4.8	4.0
Fat thickness over rib eye[1]			11.1 cm.	8.2 cm.	11.6 cm.	7.4 cm
W-B shear force, pounds[2]	16.69	15.49	14.47	16.73	16.81	16.64

1 - Use one measure; if not, indicate method.

2 - Indicate size of core used and how meat was cooked.

FORM III
SLAUGHTER DATA, 1962

Tennessee State

Location	Knoxville					
Breed of sire	Angus					
Breed of dam	Angus					
Line or group						
Sex	Steers					
Age at slaughter	440					
No. slaughtered	6					
Days in feedlot	160					
Final feedlot wt.	900					
Slaughter wt., live	838					
Carcass wt., cold	528					
Dressing percent, cold	63					
Carcass grade, quality	12.8					
Carcass grade, cutability						
Est. percent, kidney fat						
Ribeye area/100 lbs. carcass						
Marbling score						
Fat thickness over rib eye[1]	14.5 cm.					
W-B shear force, pounds[2]						

1 - Use one measure; if not, indicate method.

2 - Indicate size of core used and how meat was cooked.

TEXAS A AND M UNIVERSITY
Agricultural Experiment Station

I. PROJECT: Animal Husbandry 650, AH Line Project d1-22 (S-10)

The Improvement of Production and Desirability of Beef Through Breeding Methods

II. OBJECTIVES:

To estimate, and further test by selection and breeding, genetic parameters including heritability, heterotic effect, and genetic correlations for:

1 - weaning weight
2 - post-weaning feedlot and pasture gain
3 - gain during the summer months
4 - beef value of the carcass including distribution of carcass weight among various cuts and muscle, fat, and bone
5 - eating desirability of the beef
6 - other characteristics as their possible importance becomes evident.

To test breeds and strains of unknown or unrecorded productivity.

To develop procedures and techniques adequate for practical application in:

1 - record keeping
2 - artificial insemination
3 - other areas involved in management that present an obvious need in a breeding program.

III. PERSONNEL:

T. C. Cartwright, R. J. Cooper, H. W. Franke, J. K. Riggs, H. O. Hill, W. E. Kruse, and J. M. Shelton.

IV. ACCOMPLISHMENTS DURING THE YEAR:

Beef cattle performance data from Texas Agricultural Experiment Station Substation 23 at McGregor from 1950 through 1961 and from the East Texas Pasture Laboratory at Lufkin from 1935 through 1961 were analyzed using the least-squares method of fitting constants. Herefords, Brahmans, and their crosses were represented in the data, which included approximately 2250 calves from McGregor and 550 calves from Lufkin. Estimates of the magnitude of heterotic effects were derived for birth weight, vigor score at birth, weaning weight, average daily gain on test, mature cow weight, calving percentage, calf survival percentage, and weaning percentage. Interactions between breed or cross and certain environmental factors were evaluated.

Results of the analyses of birth weight indicate that larger differences were associated with genotype of the dam than with genotype of the sire. Hereford dams produced the heaviest calves, first-cross dams produced calves with nearly average weights, and Brahman dams produced calves which were well below average. Estimated heterosis was 10.8 percent for first-cross calves. Effects of genetic and environmental factors upon vigor score at birth were generally similar to the effects of these factors upon birth weight. Heterosis was estimated to be approximately six percent.

Analyses of weaning weight data from Lufkin indicate that large breed or cross differences existed. First-cross Brahman-Hereford calves and calves from first-cross cows were substantially heavier than purebred Hereford calves. The results provide evidence of a curvilinear regression of weight of calf upon weight of dam. The heaviest calves were produced by cows which weighed 1100 to 1200 pounds. Conversion of calf weight to calf weight produced per 1000 pounds of dam reveals that this measure of production decreased rapidly as weight of the dam increased. These results have important implications with respect to optimum cow size.

Results of the analyses of 180-day weights in the McGregor data indicate a substantial advantage for crossbreds over purebreds. First-cross calves exhibited approximately 15.9 percent heterosis. Back-cross calves raised by first-cross dams were found to be 18.8 percent heavier than the average of purebred calves. The interaction between breed or cross and age of dam was evaluated and found to be a highly significant source of variation in weaning weight. Hereford, Brahman, and first-cross dams exhibited markedly different response curves. The results indicate that the use of the same correction factors for all breeds and all types of crossbreds is likely to be inadequate.

Results obtained from the analyses of average daily gain in the feedlot at McGregor indicate that approximately 11 percent heterosis existed for this trait. Gains by first-cross cattle were only moderately above those by cattle of the better parent breed. Interactions between breed or cross and sex and between breed or cross and test contributed significantly to the total variation in average daily gain.

Monthly weights of mature cows from the Lufkin herd were analyzed. Environmental factors apparently exerted large effects upon cow weight. All types of Brahman-Hereford crossbred cows were heavier than pure Hereford cows. Maximum weight was reached at an age of 10 to 11 years.

An analysis of the reproduction data from McGregor revealed wide breed or cross differences in calving, calf survival, and weaning percentages. Estimates of heterosis for calving percentage were negative for first-cross calves out of purebred dams, but these estimates were considered to be biased by non-genetic influences. Estimated heterosis for this trait for first-cross dams which produced backcross calves was 9.5 percent. Heterosis for percentage of calves which survived until weaning was 15.0 percent. The percentage of cows which weaned calves is a combined measure of the first two traits. Estimated heterosis for this trait was 0.3 percent for purebred cows with first-cross calves and was 20.3 percent for first-cross cows with backcross calves. These results reflect a large combined heterotic response by crossbred calves and crossbred dams.

Length of productive life and the number of calves produced in a cow's lifetime were evaluated for a limited number of Hereford, first-cross, and 1/4 Brahman-3/4 Hereford backcross cows at Lufkin. First-cross and backcross cows remained productive for longer periods of time and produced more calves in a lifetime than did pure Hereford cows.

The combined results of the analyses of weaning weight and mature cow weight in the Lufkin data reveal that maximum calf weight was produced by dams which were 10 to 11 years of age and that maximum cow weight was attained at this same age. These results, together with the results showing the large influence of weight of dam upon weaning weight of calf, suggest that correction of weaning weight for age of dam may be an indirect correction for weight of dam. Dairy cattle workers (Gaines et al. 1947. J. Dairy Sci., 30:273) have concluded that it is biologically unsound to correct milk-energy yield for age of cow because age, independent of live weight, has no effect upon yield. In view of the unquestioned dependence of weaning weight upon milk-energy yield of the dam, a similar conclusion might well be drawn concerning calf-weight yield by beef cows.

Hybrids characteristically exhibit what may be only a slight degree of superiority over purebreds for any given trait. However, a slight degree of superiority for each of several important traits can amount to a considerable advantage in total merit. Crossbred cows dropped more calves than did purebred cows, and more crossbred calves survived until weaning. The crossbred calves were heavier at weaning and gained slightly more in the feedlot than did purebreds. With respect to the total amount of beef produced, the combined advantage of crossbreds over the better parent breed was in excess of 20 percent.

Data furnished by Mr. Tobin Armstrong, manager of the Armstrong Ranch, Armstrong, Texas, were analyzed as a cooperative part of this project. Partial records were available for 6436 weanling Santa Gertrudis calves from 2927 different Santa Gertrudis cows during the years 1952 through 1958 on weaning weight, weaning type score, long yearling weight, and calving interval. Least squares analyses were used to study the relative importance of inheritance and environment on each of the productive traits.

Environmental effects were found to be a significant source of variation for all traits studied. The year effect showed a consistently high significant influence on each of the four economic traits studied. All effects studied had a highly significant influence on weaning weight. Results indicated that calf weaning weights should be adjusted for the effects of age of calf at weaning, age of dam, and season of calf birth if accurate selections are to be made. The mean population parameter estimate for weaning weight was 504 pounds at approximately 245 days. The heritability of weaning weight based on 811 claves, was estimated from the sire component of the paternal half-sib analysis to be .56 ± .15. A second estimate of heritability for corrected weaning weight data by the intra-sire regression of offspring on dam (188 pairs) was .18 ± .18. The pooled mean square for all interactions in each least square analysis for weaning weight was found to be significant.

Weaning type score was significantly affected by all environmental effects studied except season of birth. The results from this study indicate that weaning type score should be adjusted for the effects of

age of calf at weaning and age of dam. The heritability of weaning type score was estimated to be .34 ± .12 and .12 ± .18, respectively.

The Santa Gertrudis Breeders International classification, S and S/, was found to have a highly significant influence on both weaning weight and weaning type score. This result indicates that those factors influencing the the breed classification at long yearling age also exert a significant influence on weaning performance of the offspring.

Repeatability estimates for corrected weaning weight and weaning type score were quite low.

The limited number of records and highly significant mean square for pooled interactions rendered the yearling analysis of questionable significance. Indications were that age of calf at weaning, age of dam, and season of calf birth continued to exert a significant influence on weight at long yearling age. The yearling data available for genetic analysis were limited and were not considered to contain sufficient estimates for summary.

A study of the factors affecting calving interval was based on 3080 records. Age of dam, age of calf, year of calf birth, and calf weaning weight were each found to have a highly significant influence on calving interval. The heritability estimate for calving interval was not found to be different from zero. The intra-class correlation among cows for calving interval was estimated to be .08 from 830 pluriparous cows. The average calving interval corrected for all other main effects was 16.38 months. There was no apparent genetic or phenotypic relationship between calving interval and weaning weight or weaning score. Weaning weight and weaning grade were highly and positively related, both genetically and phenotypically.

A selection index involving weaning weight, weaning score, and calving interval calculated to estimate breeding value in young Santa Gertrudis cattle was: $I_t = 1.3X_w + 77X_s - X_c$ When I_t is a numerical estimate of a breeding value and X_w, X_s, and X_c are the phenotypic observations for weaning weight pounds, weaning type score (1 through 5) and calving interval months of the dam, respectively, R_{IH} is .68. A second index with 99 percent of the predictive value I_t was: $I_{ws} = X_w + 57.4X_s$

Average 180-day weight of all breeds at McGregor over the past 10 years was computed from least squares analyses fitting constants for age of dam, sex, season, and year, but not for weight of dam, per se. The over-all adjusted breed or cross average was 427 pounds and the averages for the various breeds are shown in Table 1.

TABLE 1. 180-Day Weights - McGregor

Breed	Number	Av. 180-Day Weight
Hereford	700	360
Angus	46	362
Brahman	206	367
Santa Gertrudis	105	427
Charolais	9	486
Charbray	49	493

Weights of calves in a group managed for maximum growth after 180 days averaged 973 pounds at 365 days of age. The highest progeny in this group were from a Brown Swiss sire and averaged 1022 pounds.

Heritability for birth weight, weaning weight, and feedlot gain was estimated from 10 years of data on 580 Herefords (H), 196 Brahman (B), 385 B x H F_1's (BH), 48 H x B F_1's (HB), 146 backcrosses to Hereford sires (HF_1), and 209 backcrosses to Brahman sires (BF_1). Constants for sex, year, and age of dam obtained from least squares analyses were applied as correction factors. Heritability was estimated from paternal half-sibs. For birth weight, estimates were: H, .15; B, .16; BH, .55; HB, .50; HF_1, .26; and BF_1, .20. The standard deviation of year x breed constants (s_{Y_xB}), an indicator of the magnitude of environmental variance within each breed type, was lowest for calves from Brahman dams and tended to increase with the percentage of Hereford of dam and/or hybridity of the calf. Heritabilities of weaning weight were: H, .24; B, .44; BH, .25; HB, .22, HF_1, .07; and BF_1; .19. The s_{Y_xB} was lowest for H and HF_1 calves. Brahman dams tended to place a ceiling on birth weight, and Hereford dams on weaning weight. For feedlot gain, relatively free of maternal influence, estimates were: H, .74; B, .23; BH, .90, HB, .00; HF_1, .42; and BF_1, .70. The s_{Y_xB} were lower for purebreds and F_1's than for backcrosses. The estimated genic variance and heritability ranked in the same order for all characters with one minor exception. For the characters observed, environmental variance was not consistently smaller in the crossbreds. Nevertheless, heritability estimates indicated selection would be roughly as effective in crossbreds as in purebreds.

V. FUTURE PLANS:

Present research and analysis of data which have been collected will be continued. Increased emphasis will be given to utilization of accumulated carcass and meats data.

VI. PUBLICATIONS:

Bragassa, C. B. 1962. Least-squares analysis of several components of beef tenderness. Ph.D. Thesis, Texas A and M University Library.

Butler, O. D., T. C. Cartwright, L. E. Kunkle, F. A. Orts, G. T. King, and D. W. Lewter. 1962. Comparative feedlot performance and carcass characteristics of Hereford and Angus steers. Journal of Animal Science, 21:298.

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Kruse, W. E. 1962. Beef cattle gain performance test results. Texas Agricultural Experiment Station, Misc. Publication 604 and 608.

Lagos, F. 1962. Genetic-environmental interactions in young growing beef cattle. M. S. Thesis, Texas A and M University Library.

Miquel, C. 1963. The effect of heterosis on heritability estimates. M. S. Thesis, Texas A and M University Library.

Parker, C. F. 1962. A biometrical evaluation of certain genetic and environmental parameters in a large herd of Santa Gertrudis cattle. Ph.D. Thesis, Texas A and M University Library.

Riggs, J. K., J. C. Smith, G. T. King, T. C. Cartwright, and J. M. Stitt. 1962. Crossbreeding for the Texas Gulf Coast. Texas Agricultural Experiment Station Progress Report 2241.

Thomas, R. C. and T. C. Cartwright. 1962. Factors affecting feedlot gain of Hereford bulls. Journal of Animal Science, 21:976 (abstract).

VI. PUBLICATIONS PLANNED:

None

Submitted by: T. C. Cartwright

Texas (7)

I. PROJECT: Supplement to Animal Husbandry 650 (S-10)

Quantity and Composition of Milk Produced by Beef Cows as Related to Growth Rate and Flesh of their Calves

II. OBJECTIVES:

To measure the levels of milk production among cows in the beef cattle population in Texas.

To determine the influence of stage of lactation on milk production in beef cows.

To determine the relationship between milk production of the dam and weaning weight of the calf.

To determine the influence of age of cow upon milk production.

To learn the effects of breed and cross upon milk production of beef cows.

To study the influence of plane of nutrition or level of supplemental feeding upon milk production of beef cows.

To study the influence of quantity and composition of milk on calf growth and weaning weight.

III. PERSONNEL:

J. K. Riggs

IV. ACCOMPLISHMENTS DURING THE YEAR:

To date, some 400 cows of Angus, Brahman, Hereford, Shorthorn, Santa Gertrudis, 1/2 Brahman-1/2 Hereford, and 1/2 Charolais-1/4 Brahman-1/4 Hereford breeding have been milked in seven different herds. Cows within the same breed in about mid-lactation have been found to yield from slightly less than two to more than 18 pounds of milk approximately 14 hours following the nurse-out. Butterfat content of the milk has been extremely variable, ranging from approximately two to eight percent, while solids-non-fat content has been quite stable at about eight to ten percent.

The well known decline in milk production of dairy cows during progress of the lactation period has not been observed in beef cows thus far, as shown in Table 1.

TABLE 1. Milk Production of Cows and Calf Gain, in Pounds, at Different Stages of Lactation for Angus and Hereford Cattle

	Stage of Lactation								
	Early, 56 Days			Middle, 98 Days			Late, 77 Days		
Breed	Daily Milk	Calf Gain/da.	Milk/lb. Gain	Daily Milk	Calf Gain/da.	Milk/lb. Gain	Daily Milk	Calf Gain/da.	Milk/lb. Gain
Angus	7.57	1.50	5.04	8.49	1.72	4.92	8.68	2.04	4.25
Hereford	4.87	0.88	5.57	6.77	1.38	4.91	6.40	1.83	3.50

These cows calved in October and November and were on pasture with supplement and silage during the period of December through March. The calves were weaned in June. The fact that feed conditions changed considerably from early to middle and late stages of lactation doubtlessly had considerable effect on production levels. The increase in rate of calf gain and decrease in milk required per pound of gain is felt to be the result of the calves consuming an increasing quantity of pasture forage as they grow older.

A very direct relationship between level of milk produced by cows and weaning weight of their calves was found in the A and M herd by combining the data for 15 Angus and 15 Hereford cows (Table 2).

TABLE 2. Relation of Level of Milk Produced by Cows and Weaning Weights of Their Calves at 205 Days of Age

Milk Production, lbs.		Weaning weight	Calf Weight	Milk per lb.
Daily	Total	205 Days, lbs.	per Day Age, lbs.	Calf Gain, lbs.*
5.50	1127	366	1.79	3.71
7.50	1537	402	1.96	4.53
10.00	2050	446	2.18	5.35

* Gain from birth to weaning excludes birth weight.

These data indicate that cows must give 7.5 pounds of milk per day or more if they are to wean calves weighing at least 400 pounds, and a level of 10 pounds appears to be about minimum for calves weighing 450 pounds. This agrees quite well with results from the herd at Substation No. 3 at Angleton, although differences in availability and nutritive content of pasture forage for the calves to graze could modify these figures considerably.

Age of cow was found to influence both milk production and calf weight in two herds from which suitable data were available (Tables 3 and 4).

TABLE 3. Weaning Weights of Calves from Angus and Hereford Cows in Three Age Groups

Breed	Age of Cows		
	3 to 5 Years	6 to 8 Years	9 to 12 Years
Angus	443	463	483
Hereford	374	397	412

TABLE 4. Milk Production and Weight of Calves from Hereford Cows of Different Ages - Menard, Texas

Age Group	No. of Cows	Milk, lb.	Calf Age, Days	Calf Wt., lbs.	Calf Wt./Day Age, lbs.
3 year old	18	4.68	139	270	1.94
4 year old	10	6.20	134	303	2.26
7 year old	10	7.50	140	331	2.36
Aged	17	8.79	136	357	2.63
Total or Av.	55	7.11	138	325	2.36

There is a degree of bias with regard to this age of dam effect because the older cows, particularly the aged, are kept in the herds to their advanced ages because they have proven to be good producers. No data are available on the same cows at different ages, and if there were, the yearly differences in forage production could be a distorting factor.

The Angus cows exceeded the Herefords at Texas A and M by nearly 34 percent in milk production. This was reflected by a 60 pound difference in weaning weights, part of which may have been brought about by a greater preponderance of bull calves in the Angus group.

The crossbred cows at Angleton exceeded the Herefords by 108 percent and showed a 153-pound increase in weaning weights of their calves. The calves in each of these groups were more nearly equal as to number of steers and heifers. It has long been felt that one of the manifestations of hybrid vigor in Brahman x European crossbred cows was an increase in milk production. This is definitely demonstrated by the milk production data shown in Table 5.

The mechanisms by which this is brought about are still obscure, but the weaning weights of the calves are a direct reflection of level of milk production, as pointed out earlier. Hybrid vigor of the calves from these crossbred cows doubtlessly was a contributing factor since it is impossible for a crossbred cow to drop a purebred calf, under circumstances which existed here, while all the Hereford cows had purebred calves. The crossbred cows were also younger (3 years old) than the Herefords (6 years old). Herds apparently differ greatly in milk production. Hereford cows at Spur and Menard are some of the best milkers we have found so far.

TABLE 5. Milk Production and Calf Weight Data for Angus and Hereford Cows at Texas A and M and for Hereford and Brahman x Hereford Crossbred Cows at TAES, Angleton, Texas

	Texas A and M*		TAES, No.3, Angleton**	
	Angus	Hereford	Hereford	B x H Crossbred
Number of cows	15	15	22	24
Daily milk, lbs.	8.61	6.44	4.14	8.60
Percent butterfat	3.60	3.30	4.10	4.10
Percent solids-not-fat	8.85	9.06	9.31	9.36
Percent total solids	12.45	12.36	13.41	13.46
Percent water	87.55	87.64	86.59	86.54
Cow wt., lbs.	-	-	824.00	900.00
Calf wt., lbs.	433.00	373.00	310.00	463.00
Calf age, days	205.00	205.00	233.00	228.00
Calf wt./day age, lbs.	2.11	1.82	1.33	2.03

*Data at Texas A and M are reported on a 205-day basis from 10/29/61 to 6/8/62.

**Cows at Angleton were milked on May 4 and again on June 26, 1962. Milk yield and composition data are an average of values found on those two dates. Calf weights were taken on June 26.

A study of level of energy supplementation for beef cows on pasture and in dry lot is in progress at Substation No. 7 of the Texas Agricultural Experiment station at Spur. Three groups of Hereford cows are maintained on pasture and three in dry lot with sorghum silage as the basic feed. The groups on pasture and dry lot are fed supplements exactly alike in protein, calcium, and phosphorus supply, but varying in energy supply, and are designated as high, medium, and low for lack of better terms. The high level groups receive 4.25 lbs. of cottonseed meal, the medium groups receive 2.75 lbs. of supplement (2 lbs. of sorghum grain and 0.75 lb. of cottonseed meal), and the low groups receive 2 lbs. of supplement (1 lb. of sorghum grain and 1 lb. of cottonseed meal) during the winter period. The test has been in progress since May 1959, and all cows on the test are the same age. These cows were milked on June 5 and 6, 1962, at about mid-lactation, with the results shown in Table 6.

TABLE 6. Data from Hereford Cow Groups Fed Three Levels of Supplemental Energy on Pasture and in Dry Lot at TAES, No. 7, Spur, Texas

	Groups on pasture, 6/6/62				Groups in Feedlot, 6/5/62				Av. or ** Total, All Groups
	High	Med.	Low	Total or Av.	High	Med.	Low	Total or Av.	
No. animals	10	9	9	28	11	11	11	33	61
Milk, lbs.*	6.67	7.63	7.88	7.39	7.39	8.35	8.39	8.04	7.72
Butterfat**					3.3	3.2	3.8	3.4	3.4
Solids-not-fat					8.44	8.52	8.35	8.44	8.44
Total solids					11.74	11.72	12.15	11.87	11.87
Cow weight	978	966	1007	984	1013	1008	1068	1030	1007
Calf wt.	216	204	213	211	199	206	211	205	208
Calf age, da.	78	81	78	79	86	88	95	90	84
Wt./da. age	2.77	2.54	2.73	2.68	2.26	2.35	2.23	2.28	2.49

*Milk production data were obtained by machine from the cows in dry lot and by weighing the calves before and after nursing the cows on pasture.

**Milk samples were not obtained from the pasture cows. Data on milk composition are from 33 cows in dry lot only.

V. FUTURE PLANS:

The work on the effects of stage of lactation, breed, cross, age of cow, and nutritional level of cow upon milk production and composition is to be continued. A milk feeding study with 20 Angus calves designed to test the effects of quantity of milk at standardized butterfat content and of three, four, and five percent butterfat at constant milk intake is nearing completion. A study of frequency of milking throughout the 24-hour period upon 24-hour milk production has begun.

VI. PUBLICATIONS:

Klett, R. H., T. R. Mason, and J. K. Riggs. 1962. Preliminary studies on milk production of beef cows. Texas Agricultural Experiment Station, Misc. Publication 591:79.

Riggs, J. K. 1963. Milk production of beef cows and weaning weights of their calves. Paper presented: Beef Cattle Field Day, Texas Agricultural Experiment Station, Substation No. 9, Balmorhea.

VII. PUBLICATIONS PLANNED:

None

Submitted by: J. K. Riggs

I. PROJECT: 714 (S-10)

Biochemical and Fundamental Physiological Changes Occurring with Genetically Variable Growth of Animals

II. OBJECTIVES:

To delineate, by quantative and mathematic descriptions, certain basic biochemical and physiological changes as they occur with growth of animals.

To evaluate particularly the phenotypic and genetic correlations of certain variations in biochemical and physiological change to modifications in patterns of postnatal growth.

To develop methods of a biochemical or physiological nature which will measure the potential rate of gain and efficiency of feed utilization in young beef animals.

III. PERSONNEL:

H. O. Kunkel

IV. ACCOMPLISHMENTS DURING THE YEAR:

The study of data obtained from wether lambs that were given drugs which affect animal growth or microbial activity led to these tentative conclusions: The weight of total reticuloruminal tissue is a sensitive expression of body weight gain, but papillary development may be independent of body growth. When papillary development is correlated with rate of gain, both criteria are apparently correlative results of variable intraruminal fermentation.

Direct evidence now indicates that variation in ruminal development in suckling lambs was principally an effect of establishing and developing a fermentation of solid feed and that the extent and variation in growth is dependent in part upon this establishment of intraruminal fermentation. The major characteristics of the development of intraruminal fermentation is the appearance of butyrate and its augmentation as a fraction of the volatile fatty acids.

Studies of weanling rats have verified that a major component of variance in body weight gain of animals can be accounted for by phenomena associated with compensatory growth. Attempts were made to find physiological or biochemical changes which may measure the maturity of the ruminant. It has been long known that feedlot performance of animals depends in part on the previous level of nutrition. Compensatory growth may follow a period of under-nutrition, but, other than in general terms, the effects of previous nutrition have been difficult to evaluate.

The nutritional status and, perhaps, the physiological age of the ruminant animal is manifested by the development of the rumen. For example, the development of the papillae with the rumen is dependent on the consumption and fermentation of solid feed. The extent of ruminal development might be a method of evaluating the effect of the nutritional history of the animal, but direct measurement of ruminal development is extremely difficult to accomplish in the intact animal.

Several experiments in the last three years, utilizing lambs from four weeks to 12 months of age, have shown that the relative tolerance a ruminant has to insulin is associated with ruminal development. Animals of similar weights but with different degrees of ruminal development, and presumably with a variable nutritional history, can be distinguished. This added "tool" for determining factors apparently associated with ruminal development may well lead to a dependable evaluation of the environmental factors that can obscure genetic differences in growth patterns of ruminants.

The findings of this study form the basis for further studies of genetic variation in growth and gain of meat type animals, and may lead to an improved technique of selecting breeding animals.

V. FUTURE PLANS:

Specific experiments underway to establish the nature of compensatory animal growth, to relate intraruminal fermentation patterns to body weight gains of lambs, and to evaluate the physiological maturity will be carried on to completion. Since the research will be carried out under additional leadership, some redirection of the work is expected in the future.

VI. PUBLICATIONS:

Kunkel, H. O., F. E. Tutt, J. C. Reagor, H. A. Glimp, and J. D. Robbins. 1962. Ruminal development of lambs related to rates of gain, anabolic estrogens, antibiotics, hydroxyzine, and terephthalic acid. Journal of Animal Science, 21:681.

Omar, E. M., J. C. Reagor, and H. O. Kunkel. 1962. Intraruminal volatile fatty acid distribution in creep-fed suckling lambs. Journal of Animal Science, 21:1008 (abstract).

Reagor, J. C., E. M. Omar, and H. O. Kunkel. 1962. Bovine ruminal development and tolerance to insulin. Journal of Animal Science, 20:1029 (abstract).

Reagor, J. C. 1963. The tolerance of lambs to chronic and acute administration of insulin as a measure of ruminal development. Master's Thesis, Texas A and M University Library.

VII. PUBLICATIONS PLANNED:

None

Submitted by: H. O. Kunkel

I. PROJECT: 959 (S-10)

Biochemical and Physiological Anomalies of Bovine Dwarfism and Their Use in Detection of Heterozygotes

II. OBJECTIVES:

To detect biochemical and physiological anomalies which may be associated with bovine dwarfism of various types, with an attempt to identify the metabolic defect(s) which cause the dwarfism.

To determine the extent to which biochemical and physiological factors which are anomalous in dwarfs vary in normal animals.

To determine the usefulness of the variation of these factors in distinguishing between normal carriers and non-carriers of the genes conditioning the dwarfism.

To use these factors in studying further the mode of inheritance of dwarfism in beef cattle.

III. PERSONNEL:

H. O. Kunkel

IV. ACCOMPLISHMENTS DURING THE YEAR:

The analyses of the free amino in sera of dwarf and normal Hereford heifers at one and two years of age and at 18, 40, 64, and 88 hours post-prandial were completed. Significant effects of fasting were observed in the level of serine, alanine, and aspartate, which showed progressive diminution; of cystine, threonine, proline, lysine, ornithine, the branched-chain amino acids (valine, leucine, and isoleucine), and the aromatic acids (tyrosine and phenylalanine), which increased during fast; and of glycine, which first increased and then dropped. The average levels of alanine, the branched-chained, and the aromatic acids were significantly higher; while the levels of glycine, serine, threonine, aspartate, histidine, citulline, and arginine were significantly lower in dwarf animals at one year of age. Differences were less evident at two years of age. Comparisons of levels at one year and two years suggest that the effects of dwarfism and of aging were in a large part similar.

Although this research has not yielded hoped-for results bearing on the primary objective of the project, that of finding a means of detecting the dwarf gene carrier, the findings have contributed much to the secondary objectives - provision of data bearing the biochemical and physiological phenomena associated with genetic variation in growth of animals.

V. FUTURE PLANS:

Hold open for publication in 1963-64. If future research provides pertinent leads, the research will likely be resumed under Project 714 (S-10).

VI. PUBLICATIONS:

Brown, H. E., H. O. Kunkel, and J. M. Prescott. 1963. Fasting amino acid patterns in plasma of normal and dwarf cattle. Journal of Animal Science, 21:970 (abstract).

VII. PUBLICATIONS PLANNED:

None

Submitted by: H. O. Kunkel

CATTLE BREED AND CROSS CODE

Breed Code	Breed
A	Angus
B	Brahman
BA	Brangus
BM	Beefmaster
BS	Brown Swiss
C	Charbray
G	Santa Gertrudis
H	Hereford
I	Holstein
J	Jersey
L	Charolais
R	Red Poll
RA	Red Angus
RB	Red Brangus
S	Shorthorn
U	Sussex

Cross Code		Dam Breed		Sire Breed
1x	=	H	-	B
2x	=	B	-	H
3x	=	1x	-	H
4x	=	1x	-	B
5x	=	3x	-	H
		9x	-	H
9x	=	H	-	1x
10x	=	3x	-	L
		5x	-	L
		9x	-	L
11x	=	H	-	G
14x	=	1x	-	R
15x	=	H	-	L
16x	=	1x	-	L
23x	=	4x	-	B
32x	=	11x	-	G
33x	=	32x	-	G
42x	=	13x	-	G
51x	=	R	-	G
52x	=	51x	-	G
61x	=	14x	-	G
62x	=	61x	-	G
66x	=	1x+2x	-	C

FORM I
COW PRODUCTION, 1962 CALF CROP

Texas State

Location	McGregor	McGregor	McGregor	McGregor	McGregor	McGregor
Breed of sire	Angus	Brahman	Charbray	Charolais	Hereford	Brown Swiss
Breed of dam	Angus	Brahman	Charbray	Charolais	Hereford	1x
Line or group[1]	Purebred	Purebred	Purebred	Purebred	Purebred and grade	Grade
No. cows exposed[2]	23	39	17	10	110	19
No. calves born[3]	22	24	17	9	105	19
Calving percent, born	95.7	61.5	100.0	90.0	95.5	100.0
Av. birth date	2/15/62	2/07/62	2/04/62	11/26/61	1/10/62	12/30/61
Av. birth wt.	59.5	67.2	92.2	93.7	75.0	79.8
No. calves weaned	19	21	14	8	98	17
Calving percent weaned[4]	82.6	53.8	82.4	80.0	89.1	89.5
Av. weaning age, days	180	180	180	180	180	180
Adj. ADG[5]	2.20	2.20	2.96	2.65	2.12	2.67
Av. type sc.[6]						
Av. cond. sc.[6]						

1 - Purebreds, grade, line, backcross, three-breed cross, treatment, etc.
2 - Total number put in breeding herd
3 - Total number born, dead + alive
4 - Number weaned, divided by number of cows exposed
5 - Indicate adjustments:

No adjustment

6 - 15, 16, and 17 = Fancy
12, 13, and 14 = Choice
9, 10, and 11 = Good
6, 7, and 8 = Medium

FORM I
COW PRODUCTION, 1962 CALF CROP

Texas State

Location	McGregor	McGregor	McGregor	McGregor	McGregor	McGregor
Breed of sire	Charbray	Hereford	Brahman	Brahman	S. Gert.	S. Gert.
Breed of dam	1x	3x and 5x	4x	23x	11x	32x
Line or group[1]	Grade	Grade	Grade	Grade	Grade	Grade
No. cows exposed[2]	31	13	17	15	20	18
No. calves born[3]	28	13	14	8	18	16
Calving percent, born	90.3	100.0	82.4	53.3	90.0	88.9
Av. birth date	1/10/62	1/23/62	2/06/62	2/24/62	1/13/62	1/30/62
Av. birth wt.	79.2	77.9	68.0	69.8	74.7	79.8
No. calves weaned	24	11	13	7	16	15
Calving percent, weaned[4]	77.4	84.6	76.5	46.7	80.0	83.3
Av. weaning age, days	180	180	180	180	180	180
Adj. ADG[5]	2.73	2.49	2.18	2.42	2.56	2.42
Av. type sc.[6]						
Av. cond. sc.[6]						

1 - Purebreds, grade, line, backcross, three-breed cross, treatment, etc.
2 - Total number put in breeding herd
3 - Total number born, dead + alive
4 - Number weaned, divided by number of cows exposed
5 - Indicate adjustments:

No adjustment

6 - 15, 16, and 17 = Fancy
12, 13, and 14 = Choice
9, 10, and 11 = Good
6, 7, and 8 = Medium

FORM I
COW PRODUCTION, 1962 CALF CROP

Texas State

Location	McGregor	McGregor				
Breed of sire	G	L				
Breed of dam	1/2 G and over	1/2 L and over				
Line or group[1]	Grade	Grade				
No. cows exposed[2]	27	32				
No. calves born[3]	24	21				
Calving percent, born	88.9	65.6				
Av. birth date	2/1/62	1/18/62				
Av. birth wt.	83.3	81.9				
No. calves weaned	21	19				
Calving percent, weaned[4]	77.8	59.4				
Av. weaning age, days	180	180				
Adj. ADG[5]	2.58	2.71				
Av. type sc.[6]						
Av. cond. sc.[6]						

1 - Purebreds, grade, line, backcross, three-breed cross, treatment, etc.
2 - Total number put in breeding herd.
3 - Total number born, dead + alive.
4 - Number weaned, divided by number of cows exposed.
5 - Indicate adjustments:

No adjustments

6 - 15, 16, and 17 = Fancy
12, 13, and 14 = Choice
9, 10, and 11 = Good
6, 7, and 8 = Medium

FORM II
POSTWEANING PERFORMANCE OF CALVES FED IN 1962

Texas State

	Location	McGregor	McGregor	McGregor	McGregor	McGregor	McGregor
	Breed of sire	Angus*	Angus**	Brahman*	Brahman**	Charbray*	Charbray**
	Breed of dam	Angus*	Angus**	Brahman*	Brahman**	Charbray*	Charbray**
	Line or group[1]						
Bulls	No. in group						
	Feed regime[2]						
	Av. init. age						
	Av. init. wt.						
	AV.no.da.fed						
	Av. final wt.						
	ADG on test						
	Av. type sc.						
	Av. cond. sc.						
	Av. inbreeding						
Heifers	No. in group	1	6	2	8	2	4
	Feed regime[2]						
	Av. init. age	212	245	223	242	236	242
	Av. init. wt.	373	433	449	457	550	554
	Av.no.da.fed	140	140	140	140	140	140
	Av. final wt.	489	634	580	637	681	795
	ADG on test	0.8	1.4	1.0	1.3	1.0	1.7
	Av. type sc.						
	Av. cond. sc.	37	47	40	46	44	50
	Av. inbreeding	none	none	none	none	none	none
Steers	No. in group						
	Feed regime[2]						
	Av. init. age						
	Av. init. wt.						
	Av.no.da.fed						
	Av. final wt.						
	ADG on test						
	Av. type sc.						
	Av. cond. sc.						
	Av. inbreeding						

1 - Show whether station-owned or cooperator-owned, in addition to other group designation.

2 - Feed regime:

	Bulls	Heifers	Steers
How fed - full, limited, etc.			
Pounds/day over feeding period			
Ration:		Oat grazing. Fed, free choice, regular test ration to supplement grazing due to insufficient growth of oats during feed period.	

* First test
** Second test

FORM II
POSTWEANING PERFORMANCE OF CALVES FED IN 1962

Texas State

Location		McGregor	McGregor	McGregor	McGregor	McGregor	McGregor
Breed of sire		Charolais*	Charolais**	Hereford*	Hereford**	S. Gert.*	S. Gert.**
Breed of dam		Charolais*	Charolais**	Hereford*	Hereford**	11x *	11x **
Line or group[1]							
Bulls	No. in group						
	Feed regime[2]						
	Av. init. age						
	Av. init. wt.						
	Av.no.da.fed						
	Av. final wt.						
	ADG on test						
	Av. type sc.						
	Av. cond. sc.						
	Av. inbreeding						
Heifers	No. in group	3	1	24	12	6	2
	Feed regime[2]						
	Av. init. age	272	217	244	250	233	261
	Av. init. wt.	590	485	479	447	504	589
	Av.no.da.fed	140	140	140	140	140	140
	Av. final wt.	735	718	629	660	647	781
	ADG on test	1.0	1.7	1.1	1.5	1.0	1.4
	Av. type sc.						
	Av. cond. sc.	44	53	42	45	47	53
	Av. inbreeding	none	none	none	none	none	none
Steers	No. in group						
	Feed regime[2]						
	Av. init. age						
	Av. init. wt.						
	Av.no.da.fed						
	Av. final wt.						
	ADG on test						
	Av. type sc.						
	Av. cond. sc.						
	Av. inbreeding						

1 - Show whether station-owned or cooperator-owned, in addition to other group designatio

2 - Feed regime:

	Bulls	Heifers	Steers
How fed - full, limited, etc.			
Pounds/day over feeding period			
Ration:		Oat grazing. Fed, free choice, regular test ration to supplement grazing due to insufficient growth of oats during feed period.	

* First test
** Second test

FORM II
POSTWEANING PERFORMANCE OF CALVES FED IN 1962

Texas State

Location		McGregor	McGregor	McGregor	McGregor	McGregor	McGregor
Breed of sire		S. Gert.*	S. Gert.**	S. Gert.*	S. Gert.**	S. Gert.*	S. Gert.**
Breed of dam		32x *	32x **	33x *	33x **	42x *	42x **
Line or group[1]							
Bulls	No. in group						
	Feed regime[2]						
	Av. init. age						
	Av. init. wt.						
	Av.no.da.fed						
	Av. final wt.						
	ADG on test						
	Av. type sc.						
	Av. cond. sc.						
	Av. inbreeding						
Heifers	No. in group	1	2	1		1	
	Feed regime[2]						
	Av. init. age.	215	256	211		239	
	Av. init. wt.	472	533	442		536	
	Av.no.da.fed	140	140	140		140	
	Av. final wt.	620	756	628		700	
	ADG on test	1.1	1.6	1.3		1.2	
	Av. type sc.						
	Av. cond. sc.	60	49	50		50	
	Av. inbreeding	none	none	none		none	
Steers	No. in group						
	Feed regime[2]						
	Av. init. age						
	Av. init. wt.						
	Av.no.da.fed						
	Av. final wt.						
	ADG on test						
	Av. type sc.						
	Av. cond. sc.						
	Av. inbreeding						

1 - Show whether station-owned or cooperator-owned, in addition to other group designation.

2 - Feed regime:	Bulls	Heifers	Steers
How fed - full, limited, etc.			
Pounds/day over feeding period			
Ration:		Oat grazing. Fed free choice, regular test ration to supplement grazing due to insufficient growth of oats during feed period.	

* First test
** Second test

FORM II
POSTWEANING PERFORMANCE OF CALVES FED IN 1962

Texas State

Location		McGregor	McGregor	McGregor	McGregor	McGregor	McGregor
Breed of sire		S. Gert.*	S. Gert.**	S. Gert.*	S. Gert.**	S. Gert.*	S. Gert.**
Breed of dam		51x *	51x **	14x *	14x **	61x *	61x **
Line or group[1]							
Bulls	No. in group						
	Feed regime[2]						
	Av. init. age						
	Av. init. wt.						
	Av.no.da.fed						
	Av. final wt.						
	ADG on test						
	Av. type sc.						
	Av. cond. sc.						
	Av. inbreeding						
Heifers	No. in group	4	2	2		1	1
	Feed regime[2]						
	Av. init. age	218	231	241		211	240
	Av. init. wt.	489	467	567		476	546
	Av.no.da.fed	140	140	140		140	140
	Av. final wt.	670	626	707		677	738
	ADG on test	1.3	1.1	1.0		1.4	1.4
	Av. type sc.						
	Av. cond. sc.	51	52	4 3		50	50
	Av. inbreeding	none	none	none		none	none
Steers	No. in group						
	Feed regime[2]						
	Av. init. age						
	Av. init. wt.						
	Av.no.da.fed						
	Av. final wt.						
	ADG on test						
	Av. type sc.						
	Av. cond. sc.						
	Av. inbreeding						

1 - Show whether station-owned or cooperator-owned, in addition to other group designatio.

2 - Feed regime:

	Bulls	Heifers	Steers
How fed - full, limited, etc.			
Pounds/day over feeding period			
Ration:		Oat grazing. Fed free choice regular test ration to supplement grazing due to insufficient growth of oats during feed period.	

* First test
** Second test

FORM II
POSTWEANING PERFORMANCE OF CALVES FED IN 1962

Texas State

Location		McGregor	McGregor	McGregor	McGregor	McGregor	McGregor
Breed of sire		S. Gert.*	S. Gert.**	Charolais*	Charolais**	Brahman*	Brahman**
Breed of dam		62x *	62x **	10x *	10x **	4x *	4x **
Line or group[1]							
Bulls	No. in group						
	Feed regime[2]						
	Av. init. age						
	Av. init. wt.						
	Av.no.da.fed						
	Av. final wt.						
	ADG on test						
	Av. type sc.						
	Av. cond. sc.						
	Av. inbreeding						
Heifers	No. in group		1	1		2	2
	Feed regime[2]						
	Av. init. age		227	239		227	266
	Av. init. wt.		530	570		447	504
	Av.no.da.fed		140	140		140	140
	Av. final wt.		704	730		610	667
	ADG on test		1.2	1.1		1.2	1.1
	Av. type sc.						
	Av. cond. sc.		50	50		43	50
	Av. inbreeding		none	none		none	none
Steers	No. in group						
	Feed regime[2]						
	Av. init. age						
	Av. init. wt.						
	Av.no.da.fed						
	Av. final wt.						
	ADG on test						
	Av. type sc.						
	Av. cond. sc.						
	Av. inbreeding						

1 - Show whether station-owned or cooperator-owned, in addition to other group designation.

2 - Feed regime:	Bulls	Heifers	Steers
How fed - full, limited, etc.			
Pounds/day over feeding period			
Ration:		Oat grazing. Fed free choice regular test ration to supplement grazing due to insufficient growth of oats during feeding period.	

* First test
** Second test

FORM II
POSTWEANING PERFORMANCE OF CALVES FED IN 1962

Texas State

Location	McGregor	McGregor	McGregor	McGregor	McGregor	McGregor
Breed of sire	Brahman*	Brahman**	B. Swiss*	B. Swiss**	Charolais*	Charolais**
Breed of dam	23x*	23x**	1x*	1x**	66x*	66x**
Line or group[1]						
Bulls						
No. in group						
Feed regime[2]						
Av. init. age						
Av. init. wt.						
Av.no.da.fed						
Av. final wt.						
ADG on test						
Av. type sc.						
Av. cond. sc.						
Av. inbreeding						
Heifers						
No. in group	1	3	9	1	1	
Feed regime[2]						
Av. init. age	235	217	234	257	212	
Av. init. wt.	460	473	544	561	434	
Av.no.da.fed	140	140	140	140	140	
Av. final wt.	635	648	725	730	579	
ADG on test	1.3	1.3	1.3	1.2	1.0	
Av. type sc.						
Av. cond. sc.	40	47	43	53	40	
Av. inbreeding	none	none	none	none	none	
Steers						
No. in group						
Feed regime[2]						
Av. init. age						
Av. init. wt.						
Av.no.da.fed						
Av. final wt.						
ADG on test						
Av. type sc.						
Av. cond. sc.						
Av. inbreeding						

1 - Show whether station-owned or cooperator-owned, in addition to other group designation.

2 - Feed regime:

	Bulls	Heifers	Steers
How fed - full, limited, etc.			
Pounds/day over feeding period			
Ration:		Oat grazing. Fed free-choice regular test ration to supplement grazing due to insufficient growth of oats during feeding period.	

* First test
** Second test

FORM II
POSTWEANING PERFORMANCE OF CALVES FED IN 1962

Texas State

	Location	McGregor	McGregor	McGregor	McGregor		
	Breed or sire	Charolais*	Charolais**	Charolais*	Charolais**		
	Breed of dam	15x*	15x**	16x*	16x**		
	Line or group[1]						
Bulls	No. in group						
	Feed regime[2]						
	Av. init. age						
	Av. init. wt.						
	Av.no.da.fed						
	Av. final wt.						
	ADG on test						
	Av. type sc.						
	Av. cond. sc.						
	Av. inbreeding						
Heifers	No. in group	1		1			
	Feed regime[2]						
	Av. init. age.	259		237			
	Av. init. wt.	604		541			
	Av.no.da.fed	140		140			
	Av. final wt.	778		726			
	ADG on test	1.2		1.3			
	Av. type sc.						
	Av. cond. sc.	47		43			
	Av. inbreeding	none		none			
Steers	No. in group						
	Feed regime[2]						
	Av. init. age						
	Av. init. wt.						
	Av.no.da.fed						
	Av. final wt.						
	ADG on test						
	Av. type sc.						
	Av. cond. sc.						
	Av. inbreeding						

1 - Show whether station-owned or cooperator-owned, in addition to other group designation.

2 - Feed regime:	Bulls	Heifers	Steers
How fed - full, limited, etc.			
Pounds/day over feeding period			
Ration:		Oat grazing. Fed free-choice regular test ration to supplement grazing due to unsufficient growth of oats during feeding period.	

* First test
** Second test

FORM II
POSTWEANING PERFORMANCE OF CALVES FED IN 1962

Texas State

	Location	McGregor	McGregor	McGregor	McGregor	McGregor	McGregor
	Breed of sire	Angus*	Angus**	Brahman*	Brahman**	Charbray*	Charbray**
	Breed of dam	Angus*	Angus**	Brahman*	Brahman**	Charbray*	Charbray**
	Line or group[1]	Sub. 23	Sub. 23	Sub. 23	Sub. 23	Sub. 23	Sub. 23
Bulls	No. in group	2	7	1	5	3	2
	Feed regime[2]						
	Av. init age	214	244	209	256	220	239
	Av. init. wt.	526	567	454	564	599	807
	Av.no.da.fed	140	140	140	140	140	140
	Av. final wt.	859	947	816	905	992	1287
	ADG on test	2.4	2.7	2.6	2.4	2.8	3.5
	Av. type sc.						
	Av. cond sc.	60	57	47	51	48	62
	Av. inbreeding	none	none	none	none	none	none
Heifers	No. in group			1	2	10	6
	Feed regime[2]						
	Av. init. age			224	247	228	246
	Av. init. wt.			368	414	559	583
	Av.no.da.fed			140	140	140	140
	Av. final wt.			649	696	883	899
	ADG on test			2.0	2.1	2.3	2.3
	Av. type sc.						
	Av. cond. sc.			43	50	60	61
	Av. inbreeding			none	none	none	none
Steers	No. in group			1			1
	Feed regime[2]						
	Av. init. age			238			217
	Av. init. wt.			423			651
	Av.no.da.fed			140			140
	Av. final wt.			727			1051
	ADG on test			2.2			2.9
	Av. type sc.						
	Av. cond. sc.			53			53
	Av. inbreeding			none			none

1 - Show whether station-owned or cooperator-owned, in addition to other group designation

2 - Feed regime:

	Bulls	Heifers	Steers
How fed - full, limited, etc.	Full-fed, free choice	Full-fed, free choice	Full-fed, free choice
Pounds/day over feeding period	18.7 lbs.	18.7 lbs.	18.7 lbs.

Ration:

(Same ration fed to all.)
50% ground Sudan hay
30% ground milo
10% cottonseed meal
10% ground oats

800 USP units of Vitamin A concentrate added
Salt and bone meal free choice

* First test
** Second test

FORM II
POSTWEANING PERFORMANCE OF CALVES FED IN 1962

Texas State

	Location	McGregor	McGregor	McGregor	McGregor	McGregor	McGregor
	Breed of sire	Charolais*	Charolais**	Hereford*	Hereford**	Charbray*	Charbray**
	Breed of dam	Charolais*	Charolais**	Hereford*	Hereford**	1x*	1x**
	Line or group[1]	Sub. 23	Sub. 23	Sub. 23	Sub. 23	Sub. 23	Sub. 23
Bulls	No. in group	4		10	4		
	Feed regime[2]						
	Av. init. age	286		235	248		
	Av. init. wt.	724		527	541		
	Av.no.da.fed.	140		140	140		
	Av. final wt.	1113		880	954		
	ADG on test	2.8		2.5	3.0		
	Av. type sc.						
	Av. cond. sc.	47		52	60		
	Av. inbreeding						
Heifers	No. in group			20	9	10	6
	Feed regime[2]						
	Av. init. age			233	233	228	246
	Av. init. wt.			404	381	559	583
	Av.no.da.fed			140	140	140	140
	Av. final wt.			671	684	883	899
	ADG on test			1.9	2.2	2.3	2.3
	Av. type sc.						
	Av. cond. sc.			48	52	60	61
	Av. inbreeding			none	none	none	none
Steers	No. in group			15	3		
	Feed regime[2]						
	Av. init. age			237	219		
	Av. init. wt.			397	431		
	Av.no.da.fed			140	140		
	Av. final wt.			698	721		
	ADG on test			2.1	2.1		
	Av. type sc.						
	Av. cond. sc.			50	48		
	Av. inbreeding			none	none		

1 - Show whether station-owned or cooperator-owned, in addition to other group designation.

2 - Feed regime:

	Bulls	Heifers	Steers
How fed - full, limited, etc.	Full-fed, free choice	Full-fed, free choice	Full-fed, free choice
Pounds/day over feeding period	18.7 lbs.	18.7 lbs.	18.7 lbs.
Ration:	(Same ration fed to all.) 50% groups Sudan hay 30% ground milo 10% cottonseed meal 10% ground oats 800 USP units of Vitamin A concentrate added Salt and bone meal free choice		

* First test
** Second test

FORM II
POSTWEANING PERFORMANCE OF CALVES FED IN 1962

Texas State

	Location	McGregor	McGregor	McGregor	McGregor	McGregor	McGregor
	Breed of sire	Brahman*	Brahman**	Hereford*	Hereford**	Charbray*	Charbray**
	Breed of dam	4x*	4x**	3x X 9x*	3x X 9x**	13x*	13x**
	Line or group[1]	Sub. 23	Sub. 23	Sub. 23	Sub. 23	Sub. 23	Sub. 23
Bulls	No. in group						
	Feed regime[2]						
	Av. init. age						
	Av. init. wt.						
	Av.no.da.fed						
	Av. final wt.						
	ADG on test						
	Av. type sc.						
	Av. cond. sc.						
	Av. inbreeding						
Heifers	No. in group	3	1	3	1		1
	Feed regime[2]						
	Av. init. age	238	247	231	244		236
	Av. init. wt.	424	421	538	509		615
	Av.no.da.fed	140	140	140	140		140
	Av. final wt.	720	689	836	804		965
	ADG on test	2.1	1.9	2.1	2.1		2.5
	Av. type sc.						
	Av. cond. sc.	49	50	59	53		63
	Av. inbreeding	none	none	none	none		none
Steers	No. in group				2	1	3
	Feed regime[2]						
	Av. init. age				241	233	209
	Av. init. wt.				559	616	523
	Av.no.da.fed				140	140	140
	Av. final wt.				884	990	835
	ADG on test				2.3	2.7	2.2
	Av. type sc.						
	Av. cond. sc.				57	57	52
	Av. inbreeding				none	none	none

1 - Show whether station-owned or cooperator-owned, in addition to other group designation.

2 - Feed regime:	Bulls	Heifers	Steers
How fed - full, limited, etc			
Pounds/day over feeding period			
Ration:			

* First test
** Second test

FORM II
POSTWEANING PERFORMANCE OF CALVES FED IN 1962

Texas State

Location	McGregor	McGregor	McGregor	McGregor	McGregor	McGregor
Breed of sire	S. Gert.**	S. Gert.**	S. Gert.*	S. Gert.*	S. Gert.**	Hereford*
Breed of dam	11x**	32x**	33x*	42x*	42x**	S. Gert.*
Line or group[1]						
Bulls: No. in group						
Bulls: Feed regime[2]						
Bulls: Av. init. age						
Bulls: Av. init. wt.						
Bulls: Av.no.da.fed						
Bulls: Av. final wt.						
Bulls: ADG on test						
Bulls: Av. type sc.						
Bulls: Av. cond. sc.						
Bulls: Av. inbreeding						
Heifers: No. in group						
Heifers: Feed regime[2]						
Heifers: Av. init age						
Heifers: Av. init. wt.						
Heifers: Av.no.da.fed						
Heifers: Av. final wt.						
Heifers: ADG on test						
Heifers: Av. type sc.						
Heifers: Av. cond. sc.						
Heifers: Av. inbreeding						
Steers: No. in group	2	6	1	1	1	2
Steers: Feed regime[2]						
Steers: Av. init. age	219	230	240	238	214	248
Steers: Av. init. wt.	519	568	623	628	437	577
Steers: Av.no.da.fed	140	140	140	140	140	140
Steers: Av. final wt.	892	910	999	1016	767	915
Steers: ADG on test	2.7	2.5	2.7	2.8	2.4	2.4
Steers: Av. type sc.						
Steers: Av. cond. sc.	50	56	60	60	43	57

1 - Show whether station-owned or cooperator-owned, in addition to other group designation

2 - Feed regime:	Bulls	Heifers	Steers
How fed - full, limited, etc.			
Pounds/day over feeding period			
Ration:			

* First test
** Second test

FORM II
POSTWEANING PERFORMANCE OF CALVES FED IN 1962

Texas State

	Location	McGregor	McGregor	McGregor	McGregor	McGregor	McGregor
	Breed of sire	S. Gert.*	S. Gert.**	S. Gert.*	S. Gert.**	S. Gert.*	Brahman**
	Breed of dam	Red Poll*	Red Poll**	51x*	51x**	52x*	4x**
	Line or group[1]						
Bulls	No. in group						
	Feed regime[2]						
	Av. init. age						
	Av. init. wt.						
	Av.no.da.fed						
	Av. final wt.						
	ADG on test						
	Av. type sc.						
	Av. cond. sc.						
	Av. inbreeding						
Heifers	No. in group						
	Feed regime[2]						
	Av. init. age						
	Av. init. wt.						
	Av.no.da.fed						
	Av. final wt.						
	ADG on test						
	Av. type sc.						
	Av. cond. sc.						
	Av. inbreeding						
Steers	No. in group	1	2	1	1	1	1
	Feed regime[2]						
	Av. init. age	243	217	218	261	220	207
	Av. init. wt.	642	619	488	581	588	518
	Av.no.da.fed	140	140	140	140	140	140
	Av. final wt.	936	942	795	917	916	837
	ADG on test	2.1	2.4	2.2	2.4	2.3	2.3
	Av. type sc.						
	Av. cond. sc.	60	49	47	57	53	53
	Av. inbreeding	none	none	none	none	none	none

1 - Show whether station-owned or cooperator-owned, in addition to other group designation

2 - Feed regime:	Bulls	Heifers	Steers
How fed - full, limited, etc.			
Pounds/day over feeding period			
Ration:			

* First test
** Second test

FORM II
POSTWEANING PERFORMANCE OF CALVES FED IN 1962

Texas State

Location	McGregor	McGregor	McGregor	McGregor	McGregor	McGregor
Breed of sire	Brahman*	Brahman**	Charolais*	Charolais*	S. Gert.**	Hereford**
Breed of dam	23x*	23x**	66x*	15x*	61x**	Charolais**
Line or group[1]						
Bulls: No. in group						
Bulls: Feed regime[2]						
Bulls: Av. init. age						
Bulls: Av. init. wt.						
Bulls: Av.no.da.fed						
Bulls: Av. final wt.						
Bulls: ADG on test						
Bulls: Av. type sc.						
Bulls: Av. cond. sc.						
Bulls: Av. inbreeding						
Heifers: No. in group						
Heifers: Feed regime[2]						
Heifers: Av. init. age						
Heifers: Av. init. wt.						
Heifers: Av.no.da.fed						
Heifers: Av. final wt.						
Heifers: ADG on test						
Heifers: Av. type sc.						
Heifers: Av. cond. sc.						
Heifers: Av. inbreeding						
Steers: No. in group	1	2	2	2	1	1
Steers: Feed regime[2]						
Steers: Av. init. age	219	216	218	244	264	229
Steers: Av. init. wt.	548	511	561	677	559	658
Steers: Av.no.da.fed	140	140	140	140	140	140
Steers: Av. final wt.	934	810	878	966	957	1027
Steers: ADG on test	2.8	2.2	2.3	2.1	2.8	2.6
Steers: Av. type sc.						
Steers: Av. cond. sc.	57	50	55	52	50	57
Steers: Av. inbreeding	none	none	none	none	none	none

1 - Show whether station-owned or cooperator-owned, in addition to other group designation.

2 - Feed regime:	Bulls	Heifers	Steers
How fed - full, limited, etc.			
Pounds/day over feeding period			
Ration:			

* First test
** Second test

FORM II
POSTWEANING PERFORMANCE OF CALVES FED IN 1962

Texas State

	Location	McGregor	McGregor	McGregor			
	Breed of sire	Charbray*	Charolais*	S. Gert.*			
	Breed of dam	16x*	16x*	1x*			
	Line or group[1]						
Bulls	No. in group						
	Feed regime[2]						
	Av. init. age						
	Av. init. wt.						
	Av.no.da.fed						
	Av. final wt.						
	ADG on test						
	Av. type sc.						
	Av. cond. sc.						
	Av. inbreeding						
Heifers	No. in group						
	Feed regime[2]						
	Av. init. age						
	Av. init. wt.						
	Av.no.da.fed						
	Av. final wt.						
	ADG on test						
	Av. type sc.						
	Av. cond. sc.						
	Av. inbreeding						
Steers	No. in group	1	2	1			
	Feed regime[2]						
	Av. init. age	240	214	253			
	Av. init. wt.	517	547	588			
	Av.no.da.fed	140	140	140			
	Av. final wt.	815	863	893			
	ADG on test	2.1	2.3	2.2			
	Av. type sc.						
	Av. cond. sc.	43	52	50			
	Av. inbreeding	none	none	none			

1 - Show whether station-owned or cooperator-owned, in addition to other group designatio

2 - Feed regime:	Bulls	Heifers	Steers
How fed - full, limited, etc.			
Pounds/day over feeding period			
Ration:			

* First test

FORM III
SUALGHTER DATA, 1962

Texas State

Location	McGregor	McGregor	McGregor	McGregor	McGregor	McGregor
Breed of sire	Hereford	S. Gert.	S. Gert.	Charolais	B. Swiss	Charbray
Breed of dam	Hereford	11x	32x	10x	1x	1x
Line or group	Grade	Grade	Grade	Grade	Grade	Grade
Sex	Steers	Steers	Steers	Steers	Steers	Steers
Age at slaughter	418	418	418	418	418	418
No. slaughtered	6	3	3	1	6	6
Days in feedlot	117	117	117	117	117	117
Final feedlot wt.	781	925	958	974	995	973
Slaughter wt., live	801	927	955	1000	987	962
Carcass wt., cold	478	562	594	625	617	588
Dressing percent, cold	59.6	60.6	62.2	62.5	62.5	61.1
Carcass grade, quality	Good -	Std. +	Good -	Good +	Good +	Good
Carcass grade, cutability	2.62	3.71	1.39	1.30	3.51	1.64
Est. percent kidney fat						
Rib-eye area/100 lbs. carcass	1.90	1.59	1.80	1.89	1.74	1.64
Marbling score	Slight	Traces	Traces	Slight	Small	Slight
Fat thickness over rib eye[1]	0.53	0.59	0.34	0.38	0.64	0.78
W-B shear force, pounds[2]						

1 - Use one measure; if not, indicate method.

2 - Indicate size of core used and how meat was cooked.

FORM III
SLAUGHTER DATA, 1962

Texas State

Location	McGregor	McGregor	McGregor	McGregor	McGregor	
Breed of sire	Charolais	Hereford	S. Gert.	B. Swiss	Charbray	
Breed of dam	16x	Hereford	11x	1x	1x	
Line or group	Grade	Grade	Grade	Grade	Grade	
Sex	Steers	Bulls	Bulls	Bulls	Bulls	
Age at slaughter	418	200		205	189	
No. slaughtered	2	2	2	1	1	
Days in feedlot	117	none	none	none	none	
Final feedlot wt.	931	331	539	470	572	
Slaughter wt., live	915	305	490	434	554	
Carcass wt., cold	574	156	287	226	310	
Dressing percent, cold	62.7	51.2	58.6	52.1	56.0	
Carcass grade, quality	Good -	Std.-	Std.	Utility+	Std.+	
Carcass grade, cutability	2.28					
Est. percent, kidney fat						
Rib-eye area/100 lbs. carcass	1.80	2.74	2.62	2.45	2.42	
Marbling score	Traces					
Fat thickness over rib eye[1]	0.46	0.14	0.23	0.10	0.16	
W-B shear force, pounds[2]						

1 - Use one measure; if not, indicate method.

2 - Indicate size of core used and how meat was cooked.

VIRGINIA POLYTECHNIC INSTITUTE
Agricultural Experiment Station

I. PROJECT: S-031-8 (S-10)

Evaluation of the Effectiveness of Selection for Economic Traits in Beef Cattle

II. OBJECTIVES:

To obtain estimates of genetic parameters from field data to include:
a. heritability and repeatability of traits,
b. phenotypic and genetic correlations, and
c. proper weighting of traits in a selection index.

To study the effects of location on performance records.

To re-evaluate (and possibly identify others) the constants now being used in the Virginia BCIA program in correcting for non-genetic differences.

To study the relationship of mature weight of herd sires and dams to the performance of their offspring.

To determine the minimum postweaning gains required to obtain measurable genetic differences among animals.

To study the relationship among live animal measurements, type ratings, and growth rates.

To evaluate the effectiveness of selection on the improvement of beef cattle under farm conditions.

III. PERSONNEL:

T. J. Marlowe, R. J. Freund, and J. B. Graham

IV. ACCOMPLISHMENTS DURING THE YEAR:

The study of weights and grades of beef cattle and their relationship to performance was completed and published in Virginia Agricultural Experiment Station Bulletin 537. This study showed a positive relationship between mature weight of parent and preweaning gains of the offspring. A similar relationship was found between mature grade of parent and weaning grade of offspring.

Studies of older cattle have shown that flesh condition has a tremendous influence on body conformation and on the type score or grade received. (J. Animal Sci. 21:346). Those findings prompted a study of the effect of condition on grade of calves. Calves were scored for flesh condition in 70 Angus and 54 Hereford herds during 1961 and 1962, at the time they were graded for the Virginia BCIA program. The scoring system used was:

1 = very thin, 2 = thin, 3 = average, 4 = good, and 5 = fat. All scoring was done by official BCIA graders. Scores were obtained on 3749 Angus and 2447 Hereford calves ranging in age from 90 to 450 days.

Each breed was handled separately in the statistical analyses. Calves were subdivided into four age groups of 90-149, 150-239, 240-299, and 300-450 days. There were no Herefords in the oldest age group. Simple correlation and regression coefficients between condition and grade are shown in Table 1 for each breed and age group. In another analyses the influence of condition on grade was estimated by the method of least squares in which age, sex, and year effects were held constant. The partial regression coefficients are shown in Table 2, along with the unadjusted grade means and distribution of condition scores.

Condition had a highly significant effect on grade ($P < .01$) of both Angus and Hereford calves. Each coefficient was significantly different from all other coefficients ($P < .01$).

TABLE 1. Correlation and Regression of Flesh Condition and Grade

Breed	Age Group	No. of Animals	Means		Correlation Coefficient	Regression Coefficient
			Cond.	Grade		
Angus	60-149	566	2.73	11.72	.324	.61 ± .07
	150-239	2299	2.95	11.90	.359	.77 ± .04
	240-299	623	3.06	12.09	.282	.56 ± .08
	300-450	261	2.74	11.51	.600	1.13 ± .09
	Combined	3749	2.92	11.87	.370	.75 ± .03
Hereford	90-149	414	2.61	11.44	.508	1.14 ± .09
	150-239	1537	2.99	11.82	.391	.75 ± .05
	240-299	496	3.15	11.84	.315	.59 ± .08
	300-450	-	-	-	-	-
	Combined	2447	2.95	11.75	.406	.79 ± .04

TABLE 2. Distribution of Condition Scores, Grade by Condition Score, and their Partial Regression Coefficients from Least Squares Analyses when Age, Sex, and Year Effects Were Held Constant

Cond. Code	Angus				Hereford			
	Number	Percent of Total	Unadj. Grade	b	Number	Percent of Total	Unadj. Grade	b
1	120	3.2	10.7	-1.20	70	2.9	9.1	-2.15
2	760	20.3	11.1	-0.75	478	19.5	11.0	-0.79
3	2210	58.9	11.9	Base	1464	59.8	11.8	Base
4	610	16.3	12.7	0.57	410	16.8	12.7	0.70
5	49	1.3	13.2	1.10	25	1.0	14.0	1.82
Total	3749	100.0	11.9		2447	100.0	11.7	

All data collected through the Virginia Beef Cattle Improvement program (BCIA) become the property of the Virginia Agricultural Experiment Station and are used to help accomplish the objectives outlined above. During 1962 performance records were obtained on 7165 calves and 476 yearling cattle in 182 Virginia herds. They were sired by 398 bulls, most of which were Angus and Hereford, with a few Shorthorns. Ninety of the bull calves were put through a 140-day ROP feeding test at Culpeper, Virginia. These records will also be used to support this project.

V. FUTURE PLANS:

This project will be revised during the coming year.

VI. PUBLICATIONS:

Marlowe, T. J. 1962. Weights and grades of beef cattle and their relation to performance. Virginia Agricultural Experiment Station Bulletin 537.

Marlowe, T. J. 1962. Relation of mature weight and grade of parent to pre-weaning performance of beef calves. J. Animal Sci. 21:974 (abstract).

Marlowe, T. J. 1962. Start your own testing program. The Shorthorn World 47(11):49, August 1962.

Marlowe, T. J. 1963. Effects of condition on grade of beef calves. J. Animal Sci. 22:237 (abstract).

VII. PUBLICATIONS PLANNED:

Re-evaluation of environmental influence on calf performance.

Heritability estimates from BCIA data.

Submitted by: T. J. Marlowe

I. PROJECT: S-92186, AH Line Project dl-35 (S-10)

A Study of Dwarfism in Beef Cattle

II. OBJECTIVES:

To investigate the hereditary nature of dwarfism.

To determine whether the same mechanisms are responsible for dwarfism in both Angus and Hereford cattle.

To estimate the gene frequency for dwarfism in Virginia.

To determine, if possible, the abnormal physiological action of the gene responsible for the dwarfed condition, including its morphological site of gene expression, period of expression, and mode of action.

To attempt to find some method or procedure that would accurately identify carrier animals.

III. PERSONNEL:

T. J. Marlowe, N. O. Price, D. F. Watson, J. Bollet, M. S. Allen, J. R. Rooney, and W. F. Mestanza

IV. ACCOMPLISHMENTS DURING THE YEAR:

The scope, nature, and experimental procedure of the project were outlined in earlier reports. Progress reports, which have been submitted yearly since 1955, may be found in previous S-10 Annual Reports. Reports through 1958 carried the project number S-031-AH 551. After this time, however, the project was revised and assigned the number S-92186. The active project was closed out June 30, 1961. The remainder of the data has since been analyzed and published in Virginia Agricultural Experiment Station Bulletin 545, dated December 1962. Results are summarized here very briefly. Details may be found in earlier reports, the Journal of Animal Science, and Bulletin 545.

Evidence supports earlier findings that dwarfism is inherited in a simple recessive manner. However, there was considerable variation in expression among individual dwarfs, probably due to the genetic background upon which the dwarf gene was imposed. Variation in such things as birth weight and body measurements at birth, weight at all ages, height at various ages, masculinity development in young bulls, and so forth, was significantly greater among carriers and suspect cattle than among either homozygous dwarf or normal cattle.

The frequency of dwarf calves increased quite rapidly in the Hereford breed in Virginia during the late 1940's and early 1950's, reaching a peak of almost 3 percent in 1956. It has greatly decreased since 1956 due primarily to pedigree selection and progeny testing. The frequency in the Angus breed has been much lower, but it was still on the increase in 1959 (0.6%) and may not yet have reached its peak.

Comparative blood studies for PBI, phosphatase activity, calcium, inorganic phosphorus, magnesium, red cell count, total and differential white cell count, hematocrit, sedimentation rate, phosphate, glucose, and Reilly cells failed to reveal any significant differences between dwarf and normal calves.

Bioassays were conducted to compare the adrenal, gonad, growth, and thyroid-stimulating hormones of the pituitary gland. There were no significant differences between dwarf and normal cattle except in growth hormone. Growth hormone potency was significantly lower in dwarf calves.

Growth patterns of true dwarfs, known carriers, offspring of carriers, and suspect animals were studied and compared to dwarf-free animals. Dwarf calves grew at a much slower rate, were much lighter at maturity, and developed an abnormal skeletal system. This abnormality is believed to be the result of the growth hormone deficiency. The presence of a single gene for dwarfism in the carrier animal appears to exert some influence on growth, although this is only a small fraction of that exerted by the presence of a pair of genes as in the case of the true dwarf. Known carrier cattle weighed less at birth, at weaning, as yearlings, and at maturity, and were lower in height at all ages than dwarf-free cattle, indicating that the amount of growth hormone may be somewhat less in the heterozygote.

Although many gross abnormalities were apparent in the dwarf, particularly in the skeletal system, microscopic examination of numerous tissues, glands, and organs of prenatal and postnatal calves failed to reveal any significant histological differences. Normal histological patterns of skeletogenesis were observed in all fetuses. Studies of numerous thyroid, pituitary, gonad, and adrenal glands showed that glands from dwarf calves did not appear to be underdeveloped when consideration was given to differences in breed, sex, age and/or weight of calf.

Finally, our findings indicate that the Snorter dwarf condition is inherited as a simple, autosomal, recessive trait and the same gene is responsible in both the Angus and Hereford breeds. With a preference for smaller cattle with shorter legs, shorter bodies, larger chest circumference to height ratio, and extreme masculinity in bulls, cattle judges and breeders apparently favored the heterozygote in their selections during the 15 to 25 year period prior to the mid-50's. Experimental evidence presented in Bulletin 545 shows that the heterozygote more nearly approached the conformation favored during the period when the frequency for dwarfism was increasing so rapidly.

V. FUTURE PLANS:

This project has been discontinued.

VI. PUBLICATIONS:

Marlowe, T. J., W. F. Mestanza, D. F. Watson, J. R. Rooney, N. O. Price and J. S. Copenhaver. 1960. Dwarfism in beef cattle. Virginia Agricultural Experiment Station Research Report.

Marlowe, T. J., J. R. Rooney, and W. F. Mestanza. 1962. A study of dwarfism in beef cattle. Virginia Agricultural Experiment Station Bulletin 545.

VII. PUBLICATIONS PLANNED:

Journal article on variation among dwarf, carrier, and normal beef cattle.

Submitted by: T. J. Marlowe

I. PROJECT: Hatch 93901, AH Line Project d1-7 (S-10)

Heterosis from Crosses Among British Breeds of Beef Cattle

II. OBJECTIVES:

To measure heterosis obtained from crosses among Angus, Hereford, and Shorthorn beef cattle as shown by growth rate, fattening ability, and carcass quality up to approximately two years of age.

To measure productive ability of crossbred verses purebred dams.

III. PERSONNEL:

D. W. Vogt, R. C. Carter, W. H. McClure, J. A. Gaines, and J. S. Copenhaver

IV. ACCOMPLISHMENTS DURING THE YEAR:

This report summarizes the results obtained to date. Heifers and steers from the fifth and final calf crop in the first phase of the experiment were slaughtered May 17, 1962, and February 11, 1963, respectively. A five-year summary of birth information by mating groups is given in Table 1. Table 2 shows the percentage calves weaned of cows mated, and weaning weights and grades by mating groups for the five calf crops of Phase I. In Tables 3 and 4 five-year summaries of post-weaning performance and slaughter data for heifers and steers are shown.

TABLE 1. Birth Information by Mating Groups, 5-Year Average, 1957 - 1961

Kind of mating	No. cows mated	No. calves born alive	Calf crop, percent	Av. birth weights	
				Males	Females
Straightbred	144	118	82	67.9	65.4
2-breed cross	142	128	90	69.6	69.0
3-breed cross	141	125	89	71.3	66.6
Back cross	145	133	92	69.6	67.3
Av. of crossbreds	143	129	90	70.2	67.7

TABLE 2. Percentage Calves Weaned of Cows Mated, and Weaning Weights and Grades by Mating Groups, 5-Year Average, 1957 - 1961

Kind of mating	No. calves weaned	Calves weaned, percent	Av. Weaning Wt.		Feeder Calf Grades[1]	
			Steers	Heifers	Steers	Heifers
Straightbred	109	76	401	380	11.6	11.5
2-breed cross	126	89	421	387	11.7	11.1
3-breed cross	118	84	433	397	11.1	11.0
Back cross	127	88	415	389	11.2	10.9
Av. of crossbreds	124	87	424	391	11.3	11.0

[1] 11 = top good grade; 12 = low choice grade

TABLE 3. Heifer Weights, Gains from Full-Feed to Slaughter (200 days), Dressing Percentage, Loin-Eye Areas, and Slaughter and Carcass Grades, Average for 5-Year Period, 1957 - 1961

Kind of mating	No. of head	ADG	Slaughter wt.	Carcass weight	Dressing percent	Loin-eye area (sq. in.)	Grades[1] Sl.	Carc.
Straightbred	59	1.69	757	448	59.2	8.7	12.0	11.8
2-breed cross	68	1.76	776	458	59.0	8.9	12.2	12.0
3-breed cross	57	1.76	789	469	59.4	9.5	12.5	12.1
Back cross	65	1.78	790	468	59.2	9.3	12.3	11.8
Av., crossbreds	63	1.77	785	465	59.2	9.2	12.3	12.0

[1]11 = top good grade; 12 = low choice grade

TABLE 4. Steer Weights, Gains from Full-Feed to Slaughter (129 days), Dressing Percentages, Loin-eye Areas, and Slaughter and Carcass Grades, Average for 5-Year Period, 1957 - 1961

Kind of mating	No. of head	ADG	Yearling wt.	Slaughter wt.	Carc. wt.	Dressing percent	Loin-eye area (sq.in.)	Grades[1] Sl.	Carc.
Straightbred	50	2.21	766	1054	623	59.1	10.3	11.2	11.0
2-breed cross	57	2.23	816	1102	657	59.6	11.1	11.7	11.4
3-breed cross	61	2.24	826	1113	663	59.6	11.0	11.4	11.1
Back cross	62	2.22	788	1073	638	59.5	10.7	11.3	11.1
Av., crosses	59	2.23	810	1096	652	59.6	10.9	11.5	11.2

[1]11 = top good grade; 12 = low choice grade

The second phase of the project was initiated in April 1962. One hundred and twenty purebred (Angus, Hereford, and Shorthorn) and two-breed cross (Angus-Hereford, Angus-Shorthorn, and Hereford-Shorthorn) heifers were divided into six equal breeding groups. Three purebred and three crossbred bulls (one to a breeding group) were mated to these heifers in such a manner that only three-breed and back-cross progeny were produced. A 90-day breeding season extending from April 18 to July 30, 1962, was used. Birth information on this first calf crop is presented in Table 5. A comparison of progeny produced by purebred verses crossbred females will be made to obtain an estimate of heterosis in maternal effects.

TABLE 5. Birth Information by Mating Groups, Calf-Crop 1 of Phase II, 1962 Matings

Kind of dam	No. cows mated	No. calves born alive	Calf crop, percent	Av. birth weights Males	Females
Purebred	60	52	86.7	67.1	65.1
2-breed cross	60	54	90.0	70.1	64.6

V. FUTURE PLANS:

Phase II of this project will proceed as outlined.

VI. PUBLICATIONS:

None

VII. PUBLICATIONS PLANNED:

Heterosis from Crosses Among British Breeds of Beef Cattle. Abstract submitted to 9th International Congress of Genetics, The Hague, The Netherlands, February 25, 1963.

A number of publications are planned which will give the results of a complete analysis of the first phase of this project.

Submitted by: D. W. Vogt

FORM II
POSTWEANING PERFORMANCE OF CALVES FED IN 1962

Virginia State

	Location	SteelesTav.	SteelesTav.	SteelesTav.	SteelesTav.		
	Breed of sire						
	Breed of dam						
	Line or group[1]	st. bred	2-breed c.	3-breed c.	back-cross		
Bulls	No. in group						
	Feed regime[2]						
	Av. init. age						
	Av. init. wt.						
	Av.no.da.fed						
	Av. final wt.						
	ADG on test						
	Av. type sc.						
	Av. cond. sc.						
	Av. inbreeding						
Heifers	No. in group	13	12	8	13		
	Feed regime[2]						
	Av. init. age	197	200	195	187		
	Av. init. wt.	414	431	416	396		
	Av.no.da.fed	222	222	222	222		
	Av. final wt.	785	828	802	788		
	ADG on test	1.67	1.79	1.74	1.76		
	Av. sl. grade	12.1	12.7	12.5	12.4		
	Av. cond. sc.						
	Av. inbreeding						
Steers	No. in group	11	11	15	9		
	Feed regime[2]						
	Av. init. age	565	563	562	558		
	Av. init. wt.	740	787	782	786		
	Av.no.da.fed	126	126	126	126		
	Av. final wt.	1049	1103	1107	1105		
	ADG on test	2.45	2.51	2.58	2.53		
	Av. sl. grade	11.2	12.3	11.7	11.7		
	Av. cond. sc.						
	Av. inbreeding						

1 - Show whether station-owned or cooperator-owned, in addition to other group designation.

2 - Feed regime:	Bulls	Heifers	Steers
How fed - full, limited, etc.		Full-fed	Full-fed
Pounds/day over feeding period			
Ration:		8.8 lbs. corn silage 1.9 lbs. mixed hay (alfalfa and orchard-grass) 10.3 lbs. corn and cob meal 1.2 lbs. CSM (41%) Full-fed from 10/6/61 to 5/16/62	20 lbs. corn silage 2.0 lbs. mixed hay (alfalfa and orchard-grass) 13.5 lbs. corn and cob meal 2.3 lbs. CSM (41%) Full-fed from 10/8/62 to 2/11/63

FORM III
SLAUGHTER DATA, 1962

Virginia State

Location	Steeles Tavern	Steeles Tavern	Steeles Tavern	Steeles Tavern		
Breed of sire						
Breed of dam						
Line or group	Straight-bred	2-breed	3-breed	back-cross		
Sex	Heifers	Heifers	Heifers	Heifers		
Age at slaughter	419	422	417	409		
No. slaughtered	13	12	8	13		
Days in feedlot	222	222	222	222		
Final feedlot weight	785	828	802	788		
Slaughter wt., live	785	828	802	788		
Carcass wt., cold	460	487	478	461		
Dressing per-cent, hot	58.6	58.8	59.6	58.5		
Carcass grade, quality	10.9	11.7	12.2	11.5		
Carcass grade, cutability						
Est. percent kidney fat						
Rib-eye area/100 lbs. carcass	1.97	1.93	1.96	1.91		
Marbling score	4.7	5.0	5.7	4.9		
Fat thickness over rib eye[1]	0.66	0.73	0.78	0.89		
W-B shear force, pounds[2]						

1 - Use one measure; if not, indicate method.

Average of three measurements over rib eye

2 - Indicate size of core used and how meat was cooked.

FORM III
SLAUGHTER DATA, 1962

Virginia State

Location	Steeles Tavern	Steeles Tavern	Steeles Tavern	Steeles Tavern		
Breed of sire						
Breed of dam						
Line or group	Straight-bred	2-breed	3-breed	back-cross		
Sex	Steers	Steers	Steers	Steers		
Age at slaughter	691	689	688	684		
No. slaughtered	11	11	15	9		
Days in feedlot	126	126	126	126		
Final feedlot wt.	1049	1103	1107	1105		
Slaughter wt., live	1049	1103	1107	1105		
Carcass wt., hot	598	634	644	629		
Dressing per-cent, hot	57.0	57.5	58.2	56.9		
Carcass grade, quality	10.8	11.8	11.2	11.9		
Carcass grade, cutability						
Est. percent kidney fat						
Rib-eye area/100 lbs. carcass	1.66	1.69	1.64	1.60		
Marbling score	5.0	5.5	5.4	5.6		
Fat thickness over rib eye[1]	0.78	0.75	0.82	0.70		
W-B shear force, pounds[2]						

1 - Use one measure; if not, indicate method.

Average of three measurements over the rib eye

2 - Indicate size of core used and how meat was cooked.

BEEF CATTLE RESEARCH STATION
Front Royal, Virginia

I. PROJECT: AH 150.16, AH Line Project d1-4 (S-10)

The Improvement of Beef Cattle for Virginia Through Breeding Methods

II. OBJECTIVES:

Beef cattle research projects are conducted with three breeds of cattle (Angus, Hereford, and Shorthorn) and are associated with problems relating to the improvement of beef cattle for Virginia through breeding methods.

The objectives of the investigation are as follows:

To estimate the progress to be expected from mass selection as compared with family selection in the improvement of beef cattle.

To evaluate selection criteria and procedures and develop more precise and effective measures of quality and performance in beef cattle.

To simplify methods of progeny or sib testing whereby breeding cattle can be evaluated at comparatively young ages.

The long-term breeding program for the work at Front Royal may be roughly sub-divided into five phases, each of which has some direct bearing on the main objectives stated above:

(1) Test from weaning to yearling age those bull calves which appear to be herd-sire prospects on the basis of their pre-weaning performance.

(2) Progeny test as yearlings those bulls with favorable records from Phase 1.

(3) Choose as foundation sires those bulls with good records from Phases 1 and 2. Obtain 32 daughters by each foundation sire and out of unrelated cows.

(4) Allot 32 daughters from each foundation sire as follows: 16 are placed back with their sire to form an inbred line; 8 become a part of a growth herd where selection emphasis is on growth; and 8 become part of a type herd where selection emphasis is on type. For each breeding plan, measure the progress in terms of changes in growth rate and conformation. Compare the actual results with those expected from theoretical consideration.

(5) Test inbred lines for combining ability and outcross performance.

III. PERSONNEL:

B. M. Priode, K. P. Bovard, R. C. Carter, E. J. Warwick, and R. S. Temple

IV. ACCOMPLISHMENTS DURING THE YEAR:

1 - Scope and nature of work

The scope and nature of the project have remained essentially unchanged since its inception. Calves from inbred lines are now relatively more highly inbred than in earlier years. Also, mild inbreeding (< 10%) has occurred in the Angus and Shorthorn selection herds.

Bulls from four Front Royal lines, A-4 (Blackwood Bandy), A-7 (type selection), S-2 (Baron Rothes), and S-8 (growth selection), are being tested in 60 grade cows at Blacksburg. Routine type and growth performance data to weaning will be obtained.

2 - Research results

a. Shrink effects - "Shrink" was defined as withholding water overnight. Alternate shrunk and full weights were obtained at 14-day intervals for 94 ROP bulls which were group fed in lots of about 12 head each. It was concluded that until all 28-day test weights are used in the calculation of average daily gain on test, the additional accuracy gained by withholding water overnight probably will not justify the minor disturbance this causes in the calves' performance.

b. Abnormal calves born - A hydrocephalic calf, tattoo 2251 FH6, was born in mid-March. The calf was 12.5% inbred to the Coastal Beau Rollo Hereford bull. However, there is no previous history of such a defect in the Rollo calves. The calf had a typical hydrocephalic head, but was apparently normal in other gross anatomical respects.

In early April, another deformed calf, tattoo 2283 FA4, was delivered with assistance from the herdsmen. The calf resembled a Dexter bulldog monster, but weighed only 36 lbs. at birth. It was 20% inbred from Blackwood Bandy of FR 4. No previous record of a similar defect is known in this line.

c. Calf losses studied - High mortality (15.6%) in the 1962 calves prior to weaning prompted a closer look at records of calf losses since 1959. Summary data shown in Table 1 suggest that incidence of stillbirths (5-13%) is about the same among inbreds and non-inbreds, but losses among inbred calves born alive are 1-10% higher than for non-inbreds.

TABLE 1. Calf Losses Due to Stillbirths and Among Calves Born Alive, 1959-1962

Breed	Class	Number of Calves			Percent Mortality		
		Born	Still-born	Dead before weaning	Total	Due to still-births	Among live births
		A	B	C	D[1]	E[1]	F[1]
ANGUS	Inbred	166	17	34	20.5	10.2	11.4
	Non-Inbred	178	20	36	20.2	11.2	10.1
	Test	14	1	1	7.1	7.1	0
HEREFORD	Inbred	208	10	21	10.1	4.8	5.6
	Non-Inbred	80	7	11	13.8	8.8	5.5
	Test	42	2	4	9.5	4.8	5.0
SHORTHORN	Inbred	152	16	35	23.0	10.5	14.0
	Non-Inbred	157	21	28	17.8	13.4	5.1
CROSSBRED		77	1	5	6.5	1.3	5.3
	Total:	1074	95	175	16.3	8.8	8.2

[1] D = C/A; E = B/A; F = (C-B)/(A-B)

d. Midsummer results - On July 3 and 4, gains and grades of 286 live cattle were checked. Results for inbred and non-inbred groups are shown in Table 2. Higher inbreeding in the Hereford selection herds than in the Hereford inbred lines is a consequence of: (1) the use of two non-inbred Rollo (H-3) sons in 1961 - one in the Index herd (H-6) and another in the Growth herd (H-8); (2) conception rates in the Hereford inbred lines were uniformly poor; and (3) many non-inbred foundation calves by the Silver bull (0811 H-5) were tabulated with the inbred group.

TABLE 2. Midsummer Gains and Grades of Inbred and Non-Inbred Calves

Breed	Class	No.	Fx of calf	ADG	Type score
ANGUS	Inbred	45	.26	1.62	11.2
	Selection	52	.02	1.78	11.4
HEREFORD	Inbred	59	.03	1.59	11.2
	Selection	16	.05	1.41	10.5
SHORTHORN	Inbred	41	.32	1.46	10.8
	Selection	54	.02	1.62	10.9
ALL PUREBREDS		267	.11	1.60	11.1
CROSSBREDS		19	-	1.94	11.0

e. "Teachers" influence on creep-feeding consumption of calves - Bull and heifer calves were separated the week of July 9, and bull calves in six different pastures were offered creep feeding beginning July 16. Four orphan calves which had subsisted in creep feed during the preceeding 10-20 weeks were designated as "teachers" and placed in 4 of the 6 pastures. Apparently having an experienced eater in the group does encourage other calves to eat, since average consumption per calf through July 23 was 16.9 lbs. per head for 96 calves in lots having "teachers", and only 6.5 lbs. per head for 51 calves in lots limited to "self-education".

f. Insecticides differ in grub control - In cooperation with VPI entomologists and the Chemago Corporation, five pour-on systemic insecticides were applied in October 1962 to calves retained for postweaning performance tests. Average grub counts through February 1963 are shown in Table 3. Ruelene was most effective, while Bayer G347 was least effective, compared to the check groups. Grub counts in steers were about 50 percent higher than in bulls or heifers.

TABLE 3. Average Grub Counts Through February 1963

Sex	No. calves checked	Treatment 1 Ruelene	2 Famophos	3 Co-Ral	4 Tiguvon	5 Bayer G347	6 Check	Av.
Bulls	56	.2	.3	0	.1	8.8	7.9	2.9
Steers	39	0	0	.7	1.3	11.8	11.2	4.2
Heifers	124	<.1	.6	.1	2.2	4.2	9.4	2.8
Average		.1	.3	.3	1.2	8.3	9.5	3.3

g. Calf performance - Calf performance data to weaning from 2440 calves were analyzed and reported briefly in February 1963 at Memphis. Effects of inbreeding of the calf were large in Angus and small in Shorthorns, while nearly the reverse was true regarding effects of inbreeding of Angus and Shorthorn dams. Estimates of other fixed effects - years, sex, age of dam, and age of calf - were not in conflict with others published.

V. FUTURE PLANS:

Under the supervision of T. N. Meacham, Assistant Professor at VPI, a cooperative study of the effects of Vitamin A supplementation on calf vitality was begun in November 1962. Liver biopsies were obtained in November 1962 and April 1963, and will be analyzed for Vitamin A content.

Beginning in 1963, the breeding season will extend for approximately 75 days after June 1. The shift to a later breeding season was made in an effort to reduce calf losses attributed to unfavorable weather in January, February, and early March.

Refined analyses will be made of calf performance data to weaning.

VI. PUBLICATIONS:

Bovard, K. P., W. R. Harvey, and B. M. Priode. 1962. Full vs. shrunk weights for postweaning performance tests. Journal of Animal Science, 21:651 (abstract).

Bovard, K. P. and B. M. Priode. 1962. Conception rates in beef cows as affected by inbreeding of fetus, and by age and inbreeding of cows. Virginia Journal of Science, n.s. 13:210.

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VII. PUBLICATIONS PLANNED:

Experiment station bulletin on the development of the project since 1949.

Submitted by: B. M. Priode and K. P. Bovard

FORM I
COW PRODUCTION, 1962 CALF CROP

Virginia, Front Royal State

Location	FrontRoyal	FrontRoyal	FrontRoyal	FrontRoyal	FrontRoyal	FrontRoyal
Breed of sire	Angus	Angus	Angus	Angus	Angus	Angus
Breed of dam	Angus	Angus	Angus	Angus	Angus	Angus
Line or group[1]	0198-A1	8184-A1	57-A2	0218-A2	8150-A3	0210-A4
No. cows exposed[2]	10	14	5	14	15	18
No. calves born[3]	10	10	5	12	10	8
Calving percent, born	100.0	71.4	100.0	85.7	66.7	44.4
Av. birth date	2/05/62	3/06/62	1/26/62	3/11/62	2/19/62	3/09/62
Av. birth wt.	66	48	58	58	60	64
No. calves weaned	9	9	4	12	5	6
Calving percent, weaned[4]	90.0	64.3	80.0	85.7	50.0	33.3
Av. weaning age, days	207	194	224	181	199	185
Adj. ADG[5]	1.81	1.69	1.90	1.87	1.82	1.78
Av. type sc.[6]	11.6	10.8	12.0	11.6	9.7	10.8
Av. cond. sc.[6]	9.2	8.2	9.5	9.0	8.8	8.8

1 - Purebreds, grade, line, backcross, three-breed cross, treatment, etc.
2 - Total number put in breeding herd
3 - Total number born, dead + alive
4 - Number weaned, divided by number of cows exposed
5 - Indicate adjustments:

Age of dam
Season of birth
Sex of calf
Creep feeding - bulls

6 - 15, 16, and 17 = Fancy
12, 13, and 14 = Choice
9, 10, and 11 = Good
6, 7, and 8 - Medium

FORM I
COW PRODUCTION, 1962 CALF CROP

Virginia, Front Royal State

Location	FrontRoyal	FrontRoyal	FrontRoyal	FrontRoyal	FrontRoyal	FrontRoyal
Breed of sire	Angus	Angus	Angus	Angus	Hereford	Hereford
Breed of dam	Angus	Angus	Angus	Angus	Hereford	Hereford
Line or group[1]	0808-A7	9811-A7	0201-A8	9802-A8	0215-H2	0812-H7
No. cows exposed[2]	23	13	21	17	7	10
No. calves born[3]	20	10	21	12	6	8
Calving percent, born	87.0	76.9	100.0	70.6	85.7	80.0
Av. birth date	2/14/62	2/14/62	2/16/62	2/21/62	3/17/62	2/25/62
Av. birth wt.	56	54	68	58	68	62
No. calves weaned	15	8	21	8	4	6
Calving percent, weaned[4]	75.0	61.5	100.0	47.1	57.1	60.0
Av. weaning age, days	200	201	200	198	169	180
Adj. ADG[5]	1.84	2.06	1.98	2.07	1.59	1.29
Av. type sc.[6]	12.6	11.7	11.2	11.8	10.9	10.5
Av. cond. sc.[6]	9.6	9.4	9.4	9.2	8.3	8.3

1 - Purebreds, grade, line, backcross, three-breed cross, treatment, etc.
2 - Total number put in breeding herd
3 - Total number born, dead + alive
4 - Number weaned, divided by number of cows exposed
5 - Indicate adjustments:

Age of dam
Season of birth
Sex of calf
Creep feeding - bulls

6 - 15, 16, and 17 = Fancy
12, 13, and 14 = Choice
9, 10, and 11 = Good
6, 7, and 8 = Medium

FORM I
COW PRODUCTION, 1962 CALF CROP

Virginia, Front Royal State

Location	FrontRoyal	FrontRoyal	FrontRoyal	FrontRoyal	FrontRoyal	FrontRoyal
Breed of sire	Hereford	Hereford	Hereford	Hereford	Hereford	Hereford
Breed of dam	Hereford	Hereford	Hereford	Hereford	Hereford	Hereford
Line or group[1]	322-H2	373-H3	0025-H3	8801-H4	0811-H5	0059-H6
No. cows exposed[2]	7	4	7	24	69	11
No. calves born[3]	2	1	0	9	51	3
Calving percent, born	28.6	25.0	0	37.5	73.9	27.3
Av. birth date	4/11/62	2/11/62		3/25/62	2/12/62	2/26/62
Av. birth wt.	60	64		61	67	58
No. calves weaned	2	0		6	47	2
Calving percent, weaned[4]	28.6	0		25.0	68.1	18.2
Av. weaning age, days	146			160	206	200
Adj. ADG[5]	1.34			1.89	1.82	1.68
Av. type sc.[6]	10.1			11.5	12.3	11.4
Av. cond. sc.[6]	6.9			9.0	9.7	9.0

1 - Purebreds, grade, line, backcross, three-breed cross, treatment, etc.
2 - Total number put in breeding herd
3 - Total number born, dead + alive
4 - Number weaned, divided by number of cows exposed
5 - Indicate adjustments:

Age of dam
Season of birth
Sex of calf
Creep feeding - bulls

6 - 15, 16, and 17 = Fancy
12, 13, and 14 = Choice
9, 10, and 11 = Good
6, 7, and 8 = Medium

FORM I
COW PRODUCTION, 1962 CALF CROP

Virginia, Front Royal State

Location	FrontRoyal	FrontRoyal	FrontRoyal	FrontRoyal	FrontRoyal	FrontRoyal
Breed of sire	Hereford	Shorthorn	Shorthorn	Shorthorn	Shorthorn	Shorthorn
Breed of dam	Hereford	Shorthorn	Shorthorn	Shorthorn	Shorthorn	Shorthorn
Line or group[1]	0079-H8	0211-S1	885-S1	1392-S2	8290-S2	287-S4
No. cows exposed[2]	12	9	11	6	10	8
No. calves born[3]	9	7	10	5	7	2
Calving percent, born	75.0	77.8	90.9	83.3	70.0	25.0
Av. birth date	3/09/62	2/16/62	3/03/62	3/02/62	3/07/62	4/02/62
Av. birth wt.	66	70	68	58	75	62
No. calves weaned	8	7	9	3	6	2
Calving percent, weaned[4]	66.7	77.8	81.8	50.0	60.0	25.0
Av. weaning age, days	190	199	188	180	186	175
Adj. ADG[5]	1.76	1.66	1.66	1.54	1.72	1.76
Av. type sc.[6]	10.5	10.0	10.6	10.5	11.2	11.5
Av. cond. sc.[6]	8.8	8.0	8.4	8.0	8.9	8.6

1 - Purebreds, grade, line, backcross, three-breed cross, treatment, etc.
2 - Total number put in breeding herd
3 - Total number born, dead + alive
4 - Number weaned, divided by number of cows exposed
5 - Indicate adjustments:

Age of dam
Season of birth
Sex of calf
Creep feeding - bulls

6 - 15, 16, and 17 = Fancy
12, 13, and 14 = Choice
9, 10, and 11 = Good
6, 7, and 8 = Medium

FORM I
COW PRODUCTION, 1962 CALF CROP

Virginia, Front Royal State

Location	FrontRoyal	FrontRoyal	FrontRoyal	FrontRoyal	FrontRoyal	FrontRoyal
Breed of sire	Shorthorn	Shorthorn	Shorthorn	Shorthorn	Shorthorn	Shorthorn
Breed of dam	Shorthorn	Shorthorn	Shorthorn	Shorthorn	Shorthorn	Shorthorn
Line or group[1]	9158-S4	114-S5	0189-S5	0815-S7	9807-S7	0076-S8
No. cows exposed[2]	8	10	6	9	23	17
No. calves born[3]	6	10	5	7	19	15
Calving percent, born	75.0	100.0	83.3	77.8	82.6	88.2
Av. birth date	2/18/62	3/06/62	2/26/62	2/10/62	2/18/62	3/01/62
Av. birth wt.	66	60	55	64	71	66
No. calves weaned	6	7	1	6	16	14
Calving percent, weaned[4]	75.0	70.0	16.7	66.7	69.6	82.4
Av. weaning age, days	198	183	167	210	189	187
Adj. ADG[5]	1.76	1.50	1.74	1.78	1.86	1.82
Av. type sc.[6]	12.2	11.4	10.6	13.4	12.8	10.7
Av. cond. sc.[6]	9.4	8.8	8.2	9.9	9.7	8.2

1 - Purebreds, grade, line, backcross, three-breed cross, treatment, etc.
2 - Total number put in breeding herd
3 - Total number born, dead + alive
4 - Number weaned, divided by number of cows exposed
5 - Indicate adjustments:

Age of dam
Season of birth
Sex of calf
Creep feeding - bulls

6 - 15, 16, and 17 = Fancy
12, 13, and 14 = Choice
9, 10, and 11 = Good
6, 7, and 8 = Medium

FORM I
COW PRODUCTION, 1962 CALF CROP

Virginia, Front Royal State

Location	FrontRoyal	FrontRoyal				
Breed of sire	Shorthorn	Various				
Breed of dam	Shorthorn	Various				
Line or group[1]	9805-S8	Crossbred				
No. cows exposed[2]	20	24				
No. calves born[3]	18	21				
Calving percent, born	90.0	87.5				
Av. birth date	2/18/62	2/27/62				
Av. birth wt.	72	72				
No. calves weaned	18	19				
Calving percent, weaned[4]	90.0	79.2				
Av. weaning age, days	194	186				
Adj. ADG[5]	1.92	2.18				
Av. type sc.[6]	13.0	12.2				
Av. cond. sc.[6]	10.2	10.2				

1 - Purebreds, grade, line, backcross, three-breed cross, treatment, etc.
2 - Total number put in breeding herd
3 - Total number born, dead + alive
4 - Number weaned, divided by number of cows exposed
5 - Indicate adjustments:

Age of dam
Season of birth
Sex of calf
Creep feeding - bulls

6 - 15, 16, and 17 = Fancy
12, 13, and 14 = Choice
9, 10, and 11 = Good
6, 7, and 8 = Medium

FORM II
POSTWEANING PERFORMANCE OF CALVES FED IN 1962

Virginia, Front Royal State

	Location	FrontRoyal	FrontRoyal	FrontRoyal	FrontRoyal	FrontRoyal	FrontRoyal
	Breed of sire	Angus	Angus	Angus	Angus	Angus	Angus
	Breed of dam	Angus	Angus	Angus	Angus	Angus	Angus
	Line or group[1]	1166-A1	57-A2	8150-A3	890-A4	8184-A7	9811-A7
Bulls	No. in group	1	2	2	1	2	1
	Feed regime[2]						
	Av. init. age	235	224	256	221	268	184
	Av. init. wt.	588	480	536	449	574	471
	Av.no.da.fed	168	168	168	168	168	168
	Av. final wt.	1102	856	921	842	978	883
	ADG on test	3.06	2.24	2.29	2.34	2.40	2.45
	Av. type sc.	12.6	11.1	12.7	10.6	13.0	10.9
	Av. cond. sc.	12.1	9.9	11.8	9.6	11.6	9.9
	Av. inbreeding	0.20	0.38	0.19	0.25	0.08	0
Heifers	No. in group	5	7	1	2	2	
	Feed regime[2]						
	Av. init. age	269	245	287	221	260	
	Av. init. wt.	476	447	391	406	460	
	Av.no.da.fed	140	140	140	140	140	
	Av. final wt.	654	622	582	598	624	
	ADG on test	1.27	1.26	1.36	1.36	1.18	
	Av. type sc.	11.5	12.2	9.2	10.6	13.6	
	Av. cond. sc.	8.7	8.6	7.9	8.2	9.0	
	Av. inbreeding	0.26	0.27	0.38	0.25	0.02	
Steers	No. in group	3			2	2	
	Feed regime[2]						
	Av. init. age	256			254	291	
	Av. init. wt.	532			446	619	
	Av.no.da.fed	196			196	196	
	Av. final wt.	918			793	1009	
	ADG on test	1.97			1.77	1.99	
	Av. type sc.						
	Av. cond. sc.	10.8*			12.2*	12.5*	
	Av. inbreeding	0.33			0.25	0.05	

*Slaughter grade

1 - Show whether station-owned or cooperator-owned, in addition to other group designation.

2 - Feed regime:	Bulls	Heifers	Steers
How fed - full, limited, etc.	Full	Limited	Full
Pounds/day over feeding period	21.5 lbs./head	6.0 lbs./head	21.3 lbs./head
Ration:	150 lbs. molasses 1050 lbs. corn and cob meal 300 lbs. protein supplement 250 lbs. alfalfa 250 lbs. orchard grass Total: 2000 lbs.	Same ration for heifers and steers as for bulls.	

In addition, bulls had access to 1 lb. of loose hay/head/day; heifers received all the corn silage and loose hay they would clean up; and steers were fed ad lib corn silage and loose hay.

FORM II
POSTWEANING PERFORMANCE OF CALVES FED IN 1962

Virginia, Front Royal State

	Location	FrontRoyal	FrontRoyal	FrontRoyal	FrontRoyal	FrontRoyal	FrontRoyal
	Breed of sire	Angus	Angus	Angus	Hereford	Hereford	Hereford
	Breed of dam	Angus	Angus	Angus	Hereford	Hereford	Hereford
	Line or group[1]	8044-A8	9802-A8	Purchased	9157-H2	373-H3	8801-H4
Bulls	No. in group	2	1	5		1	4
	Feed regime[2]						
	Av. init. age	214	208	247		192	234
	Av. init. wt.	524	549	600		403	547
	Av.no.da.fed	168	168	168		168	168
	Av. final wt.	915	985	1017		869	981
	ADG on test	2.32	2.59	2.61		2.77	2.58
	Av. type sc.	12.0	10.1	12.9		9.0	12.4
	Av. cond. sc.	10.6	10.1	11.3		9.6	11.3
	Av. inbreeding	0	0	0		0.25	0
Heifers	No. in group	8	2		2	2	22
	Feed regime[2]						
	Av. init. age	256	240		192	250	222
	Av. init. wt.	487	454		370	400	420
	Av.no.da.fed	140	140		140	140	140
	Av. final wt.	681	634		517	569	590
	ADG on test	1.39	1.28		1.05	1.20	1.21
	Av. type sc.	12.0	12.6		10.1	9.6	8.5
	Av. cond. sc.	8.7	8.7		7.3	7.4	12.0
	Av. inbreeding	0.03	0		0.20	0.25	0
Steers	No. in group		3				3
	Feed regime[2]						
	Av. init. age		124				226
	Av. init. wt.		485				499
	Av.no.da.fed		196				196
	Av. final wt.		868				908
	ADG on test		1.95				2.08
	Av. type sc.						
	Av. cond. sc.		11.7*				11.5*
	Av. inbreeding		0				0

*Slaughter grade

1 - Show whether station- or cooperator-owned, in addition to other group designation.

2 - Feed regime:

How fed - full, limited, etc.	Bulls: Full	Heifers: Limited	Steers: Full
Pounds/day over Feeding period	21.5 lbs. per head	6.0 lbs. per head	21.3 lbs. per head
Ration:	150 lbs. molasses 1050 lbs. corn and cob meal 300 lbs. protein supplement 250 lbs. alfalfa 250 lbs. orchard grass 2000 - total	Same ration for heifers and steers as for bulls.	

In addition, bulls had access to 1 lb. of loose hay per head per day; heifers received all the corn silage and loose hay they would clean up; and steers were fed ad lib corn silage and loose hay.

FORM II
POSTWEANING PERFORMANCE OF CALVES FED IN 1962

Virginia, Front Royal State

	Location	FrontRoyal	FrontRoyal	FrontRoyal	FrontRoyal	FrontRoyal	FrontRoyal
	Breed of sire	Hereford	Hereford	Shorthorn	Shorthorn	Shorthorn	Shorthorn
	Breed of dam	Hereford	Hereford	Shorthorn	Shorthorn	Shorthorn	Shorthorn
	Line or group[1]	0806-H9	Purchased	885-S1	1392-S2	287-S4	114-S5
Bulls	No. in group	2	3		1		2
	Feed regime[2]						
	Av. init. age	172	200		237		211
	Av. init. wt.	434	528		488		427
	Av.no.da.fed	168	168		168		168
	Av. final wt.	869	927		972		786
	ADG on test	2.58	2.37		2.88		2.14
	Av. type sc.	11.6	12.4		13.0		10.7
	Av. cond. sc.	10.0	10.6		11.6		9.3
	Av. inbreeding	0	0.01		0.31		0.25
Heifers	No. in group			4	2	2	2
	Feed regime[2]						
	Av. init. age			240	216	284	196
	Av. init. wt.			387	343	528	358
	Av.no.da.fed			140	140	140	140
	Av. final wt.			597	565	704	551
	ADG on test			1.50	1.59	1.25	1.38
	Av. type sc.			10.2	12.0	13.3	12.6
	Av. cond. sc.			8.0	8.7	10.0	8.6
	Av. inbreeding			0.32	0.32	0.25	0.25
Steers	No. in group						2
	Feed regime[2]						
	Av. init. age						277
	Av. init. wt.						436
	Av.no.da.fed						196
	Av. final wt.						840
	ADG on test						2.06
	Av. type sc.						
	Av. cond. sc.						11.5*
	Av. inbreeding						0.32

* Slaughter grade

1 - Show whether station- or cooperator-owned, in addition to other group designation.

2 - Feed regime:

	Bulls	Heifers	Steers
How fed - full, limited, etc.	Full	Limited	Full
Pounds/day over feeding period	21.5 lbs. per head	6.0 lbs. per head	21.3 lbs. per head
Ration:	150 lbs. molasses 1050 lbs. corn and cob meal 300 lbs. protein supplement 250 lbs. alfalfa 250 lbs. orchard grass 2000 - total	Same ration for heifers and steers as for bulls.	

In addition, bulls had access to 1 lb. of loose hay per head per day; heifers received all the corn silage and loose hay they would clean up; and steers were fed ad lib corn silage and loose hay.

FORM II
POSTWEANING PERFORMANCE OF CALVES FED IN 1962

Virginia, Front Royal State

	Location	FrontRoyal	FrontRoyal	FrontRoyal	FrontRoyal	FrontRoyal	FrontRoyal
	Breed of sire	Shorthorn	Shorthorn	Shorthorn	Shorthorn	Shorthorn	Various
	Breed of dam	Shorthorn	Shorthorn	Shorthorn	Shorthorn	Shorthorn	Various
	Line or group[1]	8852-S7	9807-S7	8158-S8	9805-S8	Purchased	Crossbred
Bulls	No. in group	1	1	1	2	3	6
	Feed regime[2]						
	Av. init. age	226	191	264	244	207	186
	Av. init. wt.	466	413	464	500	442	425
	Av.no.da.fed	168	168	168	168	168	168
	Av. final wt.	959	760	1006	1010	848	865
	ADG on test	2.93	2.06	3.22	3.02	2.41	2.62
	Av. type sc.	11.6	11.1	11.9	12.2	13.9	10.3
	Av. cond. sc.	10.1	10.0	11.2	10.8	11.4	10.0
	Av. inbreeding	0	0	0.16	0	0	0
Heifers	No. in group	3	2	8	2		
	Feed regime[2]						
	Av. init. age	271	245	286	208		
	Av. init. wt.	440	388	461	350		
	Av.no.da.fed	140	140	140	140		
	Av. final wt.	620	613	674	532		
	ADG on test	1.28	1.60	1.52	1.30		
	Av. type sc.	12.4	13.2	11.4	11.7		
	Av. cond. sc.	9.0	9.4	8.7	8.6		
	Av. inbreeding	0	0	0.05	0		
Steers	No. in group	3		3	2		
	Feed regime[2]						
	Av. init. age	292		249	259		
	Av. init. wt.	504		435	418		
	Av.no.da.fed	196		196	196		
	Av. final wt.	935		882	868		
	ADG on test	2.19		2.28	2.30		
	Av. type sc.						
	Av. cond. sc.	12.5*		10.7*	12.0*		
	Av. inbreeding	0		0.04	0		

* Slaughter grade

1 - Show whether station- or cooperator-owned, in addition to other group designation.

2 - Feed regime:

	Bulls	Heifers	Steers
How fed - full, limited, etc.	Full	Limited	Full
Pounds/day over feeding period	21.5 lbs. per head	6.0 lbs. per head	21.3 lbs. per head
Ration:	150 lbs. molasses 1050 lbs. corn and cob meal 300 lbs. protein supplement 250 lbs. alfalfa 250 lbs. orchard grass 2000 - total	Same ration for heifers and steers as for bulls.	

In addition, bulls had access to 1 lb. of loose hay per head per day; heifers received all the corn silage and loose hay they would clean up; and steers were fed ad lib corn silage and loose hay.

FORM III
SLAUGHTER DATA, 1962

Virginia, Front Royal State

Location	FrontRoyal	FrontRoyal	FrontRoyal	FrontRoyal	FrontRoyal	
Breed of sire	Angus	Angus	Angus	Angus	Hereford	
Breed of dam	Angus	Angus	Angus	Angus	Hereford	
Line or group	1166-A1	890-A4	8184-A7	9802-A8	8801-H4	
Sex	Steer	Steer	Steer	Steer	Steer	
Age at slaughter	457	459	489	412	426	
No. slaughtered	3	2	2	3	3	
Days in feedlot	196	196	196	196	196	
Final feedlot wt.	918	793	1009	868	908	
Slaughter wt., live	876	756	970	831	864	
Carcass wt., cold	528	474	592	519	530	
Dressing percent, cold	60	63	61	62	61	
Carcass grade, quality	10.3	11.5	11.5	12.0	11.0	
Carcass grade, cutability (percent)	45.4	44.9	44.6	46.2	46.9	
Est. percent, kidney fat						
Rib-eye area/100 lbs. carcass (sq.in.)	1.93	2.59	1.82	2.01	1.79	
Marbling score						
Fat thickness over rib eye[1] (mm.)	15.5	13.2	21.8	14.1	14.8	
W-B shear force, pounds[2]						

1 - Use one measure; if not, indicate method.

2 - Indicate size of core used and how meat was cooked.

FORM III
SLAUGHTER DATA, 1962

Virginia, Front Royal State

Location	FrontRoyal	FrontRoyal	FrontRoyal	FrontRoyal		
Breed of sire	Shorthorn	Shorthorn	Shorthorn	Shorthorn		
Breed of dam	Shorthorn	Shorthorn	Shorthorn	Shorthorn		
Line or group	114-S5	8852-S7	8158-S8	9805-S8		
Sex	Steers	Steers	Steers	Steers		
Age at slaughter	482	493	454	464		
No. slaughtered	2	3	3	2		
Days in feedlot	196	196	196	196		
Final feedlot wt.	840	935	882	868		
Slaughter wt., live	788	893	855	795		
Carcass wt., cold	502	547	532	525		
Dressing percent, cold	64	61	62	66		
Carcass grade, quality	11.0	11.3	11.7	11.5		
Carcass grade, cutability(percent)	44.7	46.0	44.7	44.2		
Est. percent, kidney fat						
Rib-eye area/100 lbs. carcass(sq.in.)	2.10	1.59	1.94	1.78		
Marbling score						
Fat thickness over rib eye[1](mm.)	14.0	16.2	13.7	17.0		
W-B shear force, pounds[2]						

1 - Use one measure; if not, indicate method.

2 - Indicate size of core used and how meat was cooked.

FORM I
COW PRODUCTION, 1962 CALF CROP

West Virginia State

Location	Wardens-ville	Wardens-ville	Wardens-ville		Morgan-town	
Breed of sire	Hereford	Hereford	Hereford	Hereford	Angus	
Breed of dam	Hereford	Hereford	Hereford	Hereford	Angus	
Line or group[1]	Non-selected grade(337)	Grade(312)	Selected grade(327)	Grade (307)	Purebred	
No. cows exposed[2]	29	32	27	30	43	
No. calves born[3]	22	20	21	24	35	
Calving per-cent, born	75.9	62.5	77.8	80	81.4	
Av. birth date	2/23/62	2/24/62	2/22/62	2/21/62	4/01/62	
Av. birth wt.						
No. calves weaned	20	19	20	23	30	
Calving per-cent, weaned[4]	69	59.4	74.1	76.7	69.8	
Av. weaning age, days	166	165	167	168	149	
Adj. ADG[5]	1.45	1.41	1.45	1.58	1.57	
Av. type sc.[6]	10	10	10	11	12	
Av. cond. sc.[6]						

1 - Purebreds; grade, line, backcross, three-breed cross, treatment, etc.
2 - Total number put in breeding herd
3 - Total number born, dead + alive
4 - Number weaned, divided by number of cows exposed.
5 - Indicate adjustments:

Weights corrected for: age of dam and sex of calf; no creep

6 - 15, 16, and 17 = Fancy
12, 13, and 14 = Choice
9, 10, and 11 = Good
6, 7, and 8 = Medium